

UNIVERSITY OF ZULULAND



**The Nexus between Social Spending and Economic Growth in South Africa: A
Cointegration Approach**

By

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201264635

A Dissertation Submitted in Fulfilment of the Requirement for the Degree

Of

Masters (MCom) in Economics

Faculty of Commerce, Administration and Law (CAL)

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2019

DECLARATION

I, Ruth Thandazile Gumede, declare that this dissertation is the product of my own effort. I have to the best of my knowledge and belief, acknowledged all the resources of information used in this study, as per normal academic conventions. I further certify that this dissertation is original, and has not been submitted before, at this, or any other university, for the attainment of any degree.

Ruth Thandazile Gumede

20 February 2019

ACKNOWLEDGEMENTS

I give glory to God almighty for seeing me through this journey.

Words cannot quantify the deep gratitude I have for Mr Bulagi and Professor Greyling for their enormous support and intellectual guidance during the course for dissertation writing.

I am also grateful to the Department of Economics, especially Professor Kaseeram, for giving me an opportunity and the love for research that he has installed in postgraduate students.

I am thankful to Dr Sabela from the Department of Development Studies, for the academic support and words of encouragement during trying times in my life.

I extend my appreciation to Miss Nxumalo for introducing me to Mr Bulagi.

My profound appreciation goes to my mother, for her unconditional love and support through all the seasons of life. I am indebted to you for a lifetime.

To my brothers and sister, I am grateful for the support.

I am thankful to Brian Mazorodze, for his support throughout this journey.

To all my friends, Mrs Eneya, Mandla, Cassandra, Nana, Thulani, Lwazi, Samkelo, Harris, Zhou, Sma, Nokwanda, Zanele Olwethu, thank you for having a significant impact on my life.

ABSTRACT

South African government has been utilizing expansionary expenditure for the past two decades to tackle the declining growth and the prevailing socioeconomic challenges. This policy stance is heavily grounded in the Keynesian theory which proposes that government spending stimulates economic growth. Several empirical studies testing the Keynesian proposition are generally affirmative but these studies do not tell us how disaggregated and particular components of government spending affect economic growth. Against this background, this study contributes to existing knowledge by using a disaggregate measure of government spending to establish the association between government social spending and economic wellbeing, which is measured by economic growth, income distribution inequality and household consumption expenditure.

The autoregressive distributed Lag (ARDL) econometric modelling approach is employed to estimate the impact of disaggregated government social spending on economic growth (growth model), income inequality (Gini model) and household consumption expenditure (consumption model). Therefore, the three models utilise time series data spanning from 1983 to 2016. The results showed that education spending improves economic growth during the short run, but has an insignificant impact on economic growth in the long run. Health spending has a negative impact on economic growth during the short run, however, stimulates growth in the long run.

Social protection spending boosts economic growth during both in the short run and the long run. On the other hand, social spending on education and health have an equalizing impact on income distribution during the long run, except for social protection spending. While during the short run only health and social protection spending reduce income inequality. The long-run results for consumption model indicate that education spending has an insignificant effect on household consumption and public spending on health has a negative impact on household consumption respectively. While social protection spending promoted household consumption. Notably, all government social spending variables are unsuccessful in promoting household consumption expenditure during the short run as the impact is statistically insignificant.

Therefore, the overall results revealed that government social spending variables have a significant impact on economic wellbeing, especial during the long-run. However, the impact caused by disaggregated social spending is small. Even though the social spending components are inelastic, most have a significant impact, which makes social spending has an important role in the variation of economic growth, income distribution and household consumption spending. Another important finding is that government cannot overall rely on government social spending to boost its economic perspective therefore, may need to focus on other economic fundamentals to raise economic wellbeing.

LIST OF ABBREVIATION AND ACRONYMS

ADF	Augmented Dickey-Fuller Test
AIC	Akaike's Information Criteria
AIDS	Acquired Immunodeficiency Syndrome
AIH	Absolute Income Hypothesis
ARDL	Autoregressive Distributed Lag
ASGISA	Accelerated and Shared Growth Initiative for South Africa
BBBEE	Broad-Based Black Economic Empowerment
CUSUM	Cumulative Sum Squares
CUSUMQ	Cumulative Recursive Sum of Squares
DF	Dickey-Fuller
DOLS	Dynamic Ordinary Least Squares
ECM	Error Correction Model (Mechanism)
FDI	Foreign Direct Investment
FET	Further Education and Training
FMOLS	Fully Modified Ordinary Least Squares
GDP	Gross Domestic Product
GEAR	Growth Employment and Redistribution
GLS	Generalised Least Squares
GMM	Generalised Methods of Moments
JB	Jarque-Bera
JIPSA	Joint Initiative on Priority Skills Acquisition
LCH	Life- Cycle Hypothesis
ML	Maximum Likelihood
MTSF	Medium-Term Strategy Framework

NDP	National Development Plan
NGO	Non-Government Organization
NGP	New Growth Path
NPC	National Planning Commission
OECD	Organisation for Economic Co-operation and Development
OLS	Ordinary Least Squares
PIH	Permanent-Income Hypothesis
PP	Phillips Perron
RIH	Relative-Income Hypothesis
RIR	Real Interest Rate
SARB	South African Reserve Bank
SBC	Schwarz Bayesian Criteria
StatsSA	Statistics South Africa
STDs	Sexually Transmitted Diseases
SVAR	Structural Vector- Autoregressive
TB	Tuberculosis
VAR	Vector Autoregressive
VECM	Vector Error Correction Model

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CHAPTER ONE

OVERVIEW OF THE STUDY

1.1 INTRODUCTION

Like most of the developing economies worldwide, the South African democratic government has relied on expansionary government expenditure (fiscal policy) to facilitate the macroeconomic objectives of the country. Furthermore, the persisting rise in a socioeconomic crisis, such as income inequality, poverty and unemployment, has induced the government to channel more resources to social programmes. The allocation of more resources to social spending have resulted in increased budget needs, compared to the other components of the government that depend on the same expenditure (Odhiambo, 2015; National Treasury, 2016). Government social spending can be defined as the provision of benefits and financial contributions provided by the government, aimed at stimulating citizens' standard of living, especially during situations which adversely affect their welfare. Thus, the most prevalent government social spending is on education, health and social welfare (social protection).

Furthermore, endogenous theories suggest that government investment in education and health stimulates human capital which is required for long term growth. Moreover, a nation with a higher accumulation of human capital generates greater growth compared to a nation with a lower accumulation of human capital (Chude and Chude, 2013). Through the implementation of Accelerated Shared Growth Initiative for South Africa (ASGISA, 2006), the New Growth Path (NGP, 2011) and the National Development Plan (NDP, 2012), the government has expanded education and health care programmes, in order to increase the accumulation of human capital and also generate the inclusive growth that is required to eliminate the socioeconomic problems existing in South Africa. While social protection programmes have transformed and been used as a poverty alleviation tool, many South African households still live below the poverty line.

Recent economic studies have attached the importance of investigating the impact of disaggregated government social spending on economic growth (Khan and Basher, 2015; Chude and Chude, 2013; Mercan and Sezer, 2014; Beraldo, Montolio, and

Turati, 2009). Despite the growing interest in examining this relationship, limited scholarly attention has been paid on the South African context. Since most studies have applied the aggregated measure of government spending (Chipaumire *et al.*, 2014; Keho, 2015; Menyah and Wolde-Rufael, 2012; Odhiambo, 2015). Which does not provide a clear picture since government spending has many components by measurement.

This study seeks to explore this gap in knowledge and apply a more disaggregated approach, which does not suffer an aggregation bias, by examining the relationship between disaggregated government social spending and economic wellbeing in South Africa over the period 1983 – 2016, employing annual time series data. Economic wellbeing is measured by economic growth, income distribution and household consumption expenditure. Disaggregated government social spending on education, health and social protection are employed and has been used in the empirical literature (Khan and Basher, 2015; Mariana, 2015; Mallick and Dash, 2015). The study will apply the Auto-Regressive Distributed Lags (ARDL) Bound Testing Approach to estimate the effect of disaggregated government social spending on economic wellbeing in South Africa. This econometric modelling technique has a unique contribution since it allows variables integrated of mixed order $I(1)$ and $I(0)$ to be estimated, unlike the Vector Autoregressive models that require series to be integrated of the same order. The ARDL generates robust results for models with small sample sizes.

This study is imperatively important for policy-making purposes given the fact that South Africa is changing from prudent fiscal measures to more expansionary fiscal policies characterized by huge government spending in diverse sectors (National Treasury, 2016). In this regard, a study which examines the payoff of such heightened spending becomes important from a policy-making standpoint, in order to determine whether fiscal expansionary policy stimulates sustainable economic growth, which is necessary to achieve the 2030 objectives of the national development plan. From an academic standpoint, this research is important as it adds evidence to the scant literature on this subject available in the South African context.

1.2 PROBLEM STATEMENT

Since 1994, the democratic government of South Africa has been relying on expansionary fiscal policies, mostly characterized by increased government spending, with large portions channelled to social spending (Alm and Embaye, 2010; National Treasury, 2016; Van der Berg and Moses, 2012). Surprisingly, the expansionary government expenditure is linked to declining growth and persisting socioeconomic challenges (high-income inequality, poverty and unemployment). This disputes our conventional understanding that increasing government expenditure must enhance economic growth (Odhiambo, 2015).

Recent findings by Chipaumire *et al.* (2014) proposed that aggregate government expenditure is negatively related to economic growth. Contrary to this, Odhiambo (2015) confirmed the existence of a positive relationship between government spending and economic growth, using an aggregated measure. The studies relied on an aggregated measure of government spending which does not explain how particular components of spending affect economic growth. Also, the few existing studies conducted in South Africa have empirically examined how government spending affects economic growth, and not evaluated the impact of public spending on the wellbeing of society. With the prevailing socioeconomic crisis, the empirical assessment of the relationship between government spending and the welfare of the people is essential.

This study contributes to the existing body of knowledge by exploring disaggregated social spending, and therefore, investigates how government's social spending on education, health and social protection impacts on economic wellbeing. Economic wellbeing is measured by economic growth, income distribution and household consumption expenditure. Economic wellbeing variables allowed the researcher to empirically evaluate how government spending affects economic growth and the welfare of society.

1.3 OBJECTIVES OF THE STUDY

The primary aim of this study was to examine the impact of government social spending on economic wellbeing. This was achieved by analysing the following objectives:

- i. To determine the impact of government social spending and economic growth.
- ii. To estimate the relationship between government social spending and income inequality.
- iii. To determine the effect of government social spending on household consumption spending.

1.4 RESEARCH HYPOTHESES

To achieve these objectives the study tested the following null hypotheses:

- i. Government social spending does not have a significant impact on economic growth.
- ii. Government social spending does not have a significant effect on income inequality.
- iii. Government social spending does not have a significant impact on household consumption spending.

1.5 INTENDED CONTRIBUTION TO THE BODY OF KNOWLEDGE

This study employed a disaggregated measure of government expenditure which is government social spending on education, health and social protection to quantify the impact of government spending on economic growth. This study will contribute in a unique way since, to the best of the researcher's knowledge, no study conducted in South Africa has investigated such a relationship or used the proposed set of variables.

1.6 ORGANISATION OF THE STUDY

This dissertation incorporates seven chapters. Chapter one gives an overview of the full research. Chapter two represents the applicable literature review, which deals with the theoretical theories that assess the determinants of economic growth and the contribution of government spending. The second part of this study presents empirical literature, which explores the relationship between government social spending and

economic growth, with evidence from both international countries and from South Africa. Chapter three is concerned with income distribution and household consumption channels. The income distribution channel discusses how government social spending impacts income inequality and presents empirical studies which explore this relationship. Other factors that affect income inequality are included. The household consumption channel reveals how government social spending affects household consumption expenditure and depicts the empirical studies, which evaluate the influence that government social spending has on household spending.

Chapter four deals with South African social spending and highlights the socioeconomic challenges which contributed to the transformation of social spending.

Chapter five presents the research design, statistical strategies and econometric modelling adopted by the study and the properties of time series data and stationary process. It further discusses the theoretical framework of the Autoregressive Distributed Lag (ARDL) modelling approach, through which the cointegration (from the ARDL Bound approach) long run and the short run relationship are examined and the theoretical framework of the diagnostic test. The second part discusses the theoretical growth, Gini and consumption models to be estimated. This is followed by a description of the employed variables.

Chapter six concerns the empirical analysis and interpretation of results for the estimated model, starting with the preliminary analysis which determines the applicable econometric modelling to be adopted. Therefore, the ARDL approach is used to model first the cointegration relationship (through the ARDL Bound test) for growth, Gini and consumption models. Chapter seven presents the conclusion and policy recommendation. This chapter begins with a summary of the study and progresses to discuss the empirical results of growth, Gini and consumption models. It later presents recommendations for future policy and lastly gives the limitation of the study and advice for further research.

CHAPTER TWO

LITERATURE REVIEW

2.1 INTRODUCTION

This chapter reviews the theoretical and empirical literature which is applicable to the relationship between government spending and economic growth. Section one explores the traditional theoretical literature which gives more insight into the interaction between government expenditure and economic growth. Section two reviews the international and South African empirical literature.

2.2 RELATED THEORETICAL LITERATURE

The theoretical studies give an overview of the most relevant theories, such as the classical view, Keynesian theory, Wagner's law, Solow growth and endogenous growth theories, which gives a better understanding of the existing relationship between government expenditure and economic growth.

2.2.1 The Classical View

During the 17th century, a great debate emerged of how an economy can resume full employment in a recession phase. Smith (1776), the pioneer of classical economics, proposed a self-regulating economy, which maintains flexible price and wages that automatically adjust to the shortage and surplus and allowed the economy to regenerate full employment at equilibrium level again (Garegnani, 2007; Kurz, 2010; Mcgrattan and Ohanian, 2010). The agents participating are considered to satisfy their own interest and markets are perceived to be highly competitive. Therefore, the variation of commodities produced permits consumers preference to be fulfilled and decreases the equilibrium price. The purchasing power of the nation and aggregate demand rises collectively with the total output.

According to the classical framework during a recession, the revenue generated by firms fails to compensate and still maintains enough profit to run business. Therefore, firms start retrenching the workers which decreases the wages, and eventually the total cost that firms incur. With such enormous changes, businesses decide to drop

their prices. Consumers react by demanding more goods and services, which cause the economy's consumption to increase. Thus, during a recession, people are willing to work for lower wages just to retain their standard of living (Kurz, 2010). Therefore, firms expand their capital stock and hire more employees since their production costs have declined, and this automatically reduces unemployment and gives rise to total production and aggregate demand. The classical philosophers believed that government involvement was not required in economic activities. Instead, the notion was that the government should focus on social issues since capitalists would not finance a non-profitable development (Kanono and Sello, 2016a; McCallum, 1996; McCauley, 2001). The classical view proposed the following duties to be performed by the government:

- The government should provide defence expenditure to protect its citizens against violence and invasion by any foreign nation.
- Protection of all the individuals of society against inequity and oppression by initiating a legal system for the regulation of justice.
- Public infrastructure investment must be established and maintained, such as bridges, educational institutions, and roads, etc.

Beyond this scope, government expenditure acts as a destabilizing factor in the economy. From an empirical standpoint, Afonso and Furceri (2010) investigated how the size of the government impacts on economic growth in OECD and European countries. The results indicated that an expansion of government size was detrimental to economic growth. Chipaumire *et al.* (2014) conducted a similar study which evaluated the relationship between economic growth and government expenditure. The study found that government spending had a destabilizing impact on economic growth. Therefore, both these studies supported the classical view, and not the Keynesian framework.

2.2.2 Wagner's Theory of Increasing States Activities

According to Wagner (1883), the progress of economic activities stimulates government expenditure, through gradual development in industrialization and population growth. Therefore, technological advancement and knowledge present an obligation to enlarge the capital accumulation required for investment by all nations. Wagner's law postulates that such investment can be financed by government

corporations (Keho, 2015; Nketiah-Amponsah, 2009; Ogbuagu and Ekpenyong, 2015). Population growth and development progress induce the government to expand its welfare programmes, especially public infrastructure investment (Tang, 2009). The government has a responsibility to create a sound legal system to deal with the high inequalities existing between the wealthy and the poor. The expansion of a government's size is determined by tax revenue. Therefore, the progress of industrialization and higher income per capita stimulates the collected tax revenue and government activities. Peacock and Wiseman (1961) conducted a study to test the validity of this theory, and their findings supported Wagner's law.

Researchers, such as Antonis, Constantinos and Persefoni (2013); Gurgul and Lach (2011); Kamasa and Ofori-Abebrese (2015); Kumar, Webber, and Fargher (2012), and Tang (2009), investigated the validity of Wagner's law by employing the various versions specified for this law. These studies generated all identical results which imply that an increase in economic growth Granger causes an increase in government expenditure, and their findings supported Wagner's law. However, Bagdigen and Cetintas (2004) concluded that Wagner's law is invalid for cases in Turkey.

2.2.3 Keynesian Theory

During the Great Depression in the 1930s, the popularity of the classical framework declined since the economy failed to re-establish itself at an equilibrium level as proposed by the classical economists (Kanono and Sello, 2016). Consequently, Keynes (1936) proposed that government intervention through fiscal policy can stimulate economic activities, and could also act as an instrument to stabilize the fluctuations in the short run (Chude and Chude, 2013; Ebaidalla, 2013; Ogbuagu and Ekpenyong, 2015; Tang, 2009). The Keynesian theory proposes that price and wages are sticky in the short run, making it difficult for businesses to sell unplanned inventories. Consumers reduce their consumption and savings, while the private sector's capital stock and production diminish, causing the economy to divert further from full employment and therefore remaining in depression. According to the Keynesian framework, during the recession, which is presented by a reduction in expenditure, labour demand, production, business capital stock and aggregate income, an injection of massive government expenditure would increase aggregate demand and stimulate economic growth through the multiplier effect (Chipaumire *et*

al., 2014; Dandan, 2011; Grullón, 2012; Kamasa and Ofori-Abebrese, 2015; Keho, 2015; Odhiambo, 2015; Ziramba, 2008).

The Keynesian economists maintain that expansionary fiscal policy boosts consumers' purchasing power, therefore enhances consumption and planned investment, and, induces labour force and total production to increase. The implication of these is a rise in aggregate demand, resulting in economic growth in the short run. The Keynesian view is consistent with studies, such as by Bosupeng (2015); Gurgul and Lach (2011); Keho (2015); Mallick and Dash (2015); Mariana (2015); Mercan and Sezer (2014); Mura (2014) and Muthui, Kosimbei, Maingi and Thuku (2013), which show that increases in government expenditure stimulate economic growth.

The Keynesian model emphasises the importance of aggregate demand as it determines the level of output and aggregate income within the economy. Thus, if necessary, the government would have to incur debt by borrowing money, in order to boost aggregate demand. When the economy reaches a boom stage, the money will go back to the government, with higher tax revenue collection and lower government expenditure (Ahmad, 2014; Asghar, Azim and Rehman, 2011; Chipaumire *et al.*, 2014). According to Keynes (1936), economies are not stable by nature, and active fiscal policy is required in order for the economy to be fully efficient (Odhiambo, 2015).

2.2.4 The Solow Growth Model

Solow (1956) derived a neoclassical growth model to explain the role played by capital accumulation, effective labour and population growth in determining economic growth (Ahuru and James, 2015). However, Solow concluded that long run economic growth is determined by technological progress. The fundamental assumption of the model is that both capital and labour exhibit constant return to output, accompanied by decreasing marginal return to capital (Kanono and Sello, 2016). The model continues to predict that the quantity of output generated from units of capital and labour rise over time, as these factors of production change. Technological progress can only exist when the amount of knowledge rises. The increase in capital accumulation holding labour constant is assumed to flatter the production function.

This exogenous growth model identifies three factors which determine the accumulation of the capital stock of a nation, which are investment through its savings, labours and depreciation (Bond, Leblebicioglu, and Schiantareli, 2010). There exists

a positive relationship between savings and output. The increase in savings suggests that the rise in investment for capital, therefore, induces the size of output generated to increase. Contrary to savings, depreciation and population growth have a negative influence on the accumulation of capital stock. Depreciation occurs when the value plants, machinery and equipment brought by the firm decrease until they are total worn out, plus population growth also reduces the amount of capital allocated to each worker. Hence, depreciation and population growth are both negatively related to capital per worker since they are worn-out capital stock (Mankiw, 2010).

The accumulation of capital stock induces the economy to establish itself at a steady-state, however, this long-run growth is temporal since depreciation and population growth diminishes its positive effect. Therefore, the accumulation of capital stock by itself cannot determine sustainable growth. According to this framework, when the nation's investment is greater than the depreciation rate and population growth, the capital stock increase. However, diminish the moment depreciation rate and population growth exceeds investment.

Solow (1956) used technological progress to explain sustainable long run economic growth. Proposing that advanced technology stimulates the effectiveness of labour force by enhancing their knowledge about production techniques. Since technological progress promotes workers to be more productive, the aggregate output also increases and induces sustainable economic growth in the long run (Rao and Hassan, 2010). The Solow model assumes that technological progress cannot be explained by internal forces. Hence, the inability of the Solow framework to determine the factors influencing technological progress contributed to the formation of endogenous growth models (Lucas, 1988; Romer, 1986, 1990).

Chirwa and Odhiambo (2016) examined the validity of the exogenous growth model for three Southern African economies, with data spanning from 1970 to 2013. The ARDL model estimations results for South Africa, Malawi and Zambia confirm the assumptions of the Solow model. While Ahuru and James (2015), and Nkalu, Edeme, and Chukwuma (2018) also conducted similar investigations to verify whether the Solow growth model holds for Nigeria. The empirical evidence generated by the studies corresponds to the basic Solow model framework.

2.2.5 Endogenous Growth Theories

This section presents the endogenous growth of theoretical literature. The theories propose that sustainable economic growth is determined by investment in human capital and in technological progress. The first part reviews the growth framework proposed by Romer (1986, 1990) which highlights how knowledge spill-over and training and research development stimulates economic growth.

This is followed by the endogenous growth theory proposed by Lucas (1988, 1990), which elaborates how investment in education stimulates human capital, and induce economic growth. Lastly, Barro's growth framework, which reveals that productive government expenditure, such as education, health, public order and safety and infrastructure expenditure, boost economic growth by stimulating the production efficiency of the private sector (Mura, 2014) is discussed.

2.2.5.1: Knowledge Spill-Over Effects and Learning by Doing

Romer (1986) built on the foundation of work proposed by Arrow (1962), learning by implementing the concept. This extended version implies that when businesses expand their physical capital automatically, they acquire new knowledge to produce and manufacture effectively and efficiently. Therefore, the bulk of knowledge retained by businesses is neither rivalled nor excludable. Consequently, it disseminates freely to overall businesses within the economy (Philipp, 2012). The key features of this framework are the processes of learning by implementing the opinion that learning cannot be internalized by the firms that undertook the investment, thus, the learning is communicated to all workers and producers in the industry, making them more efficient and productive. The spill-over effect proposed by this approach suggests that knowledge production is an inadvertent side-product of production and investment activity, and therefore, it occurs spontaneously, without relying on the decisions undertaken by the firm, as long as ordinary productive activities take place (Prettner, 2013).

According to Romer's model, spill-over effects enhance labour input efficiency at the social level, and the incentive to invest remains constant through the fluctuation of capital and labour ratio. Since the marginal product of capital and profit rate do not change. The model postulates that firms would be demotivated to invest since the knowledge created is deemed to be a public good.

This prevents the private sector to internalize the full marginal benefits linked to physical capital since the benefits would circulate freely in the economy. Consequently, the private firms lower their investment in physical capital (Bloom, Romer, and Terry, 2013; Braunerhjelm, Acs, Audretsch and Carlsson, 2010). According to this framework, government participation is required when the firms under- invest. The intervention would come in the form of subsidies in the private sector's capital goods purchasing and production. This would increase the incentive to invest and the returns on investment. Consequently, the private marginal product would be at equilibrium with the social marginal product. The equilibrium is also achieved by the social marginal product of capital and the social marginal cost of capital. Fedderke (2002) criticised the model, by highlighting that non-rival and non-excludable of the characteristic of technology may induce market failure

2.2.5.2: The Intentional Creation of New Knowledge through Research and Development

The Romer (1986) framework, however, ignores the direct knowledge incorporated in labour (human capital), as it introduced the existence of externality. To remedy the problem that aroused from the 1986 hypothesis, Romer (1990) eliminated the characteristics that compel knowledge to be for the pure public good, which also induces under-investment by private firms, since the accumulated knowledge would be freely disseminated in the economy without any compensation being received by businesses (Bloom *et al.*, 2013).

Romer (1990) transformed the accumulation of knowledge from public good to mixed good, and therefore, knowledge incorporated some of the characteristics of public of good and that of a private good. Technology progress is a mix of feature of the non-rival and excludable. Thenon-rival features arise when the marginal cost of making technology available to other firms is zero (Ang and Madsen, 2011). But the exclusive part of knowledge transforms the firms from being price takers into monopolistic ones since they have acquired the monopoly power over the technological design (innovation) they have created. Thus, the imperfect competition will exist between the businesses in the economy. Knowledge is classified into two forms, which is human capital and technology design. According to this theory, human capital has private

features since it is incorporated within an individual. Therefore, when people die, it is no longer useful and human capital value reaches point zero.

While technological techniques can be freely distributed to another firm in the economy at zero marginal cost compensation. However, the firms would want to inherit all the benefit by owning the exclusive rights to the design they have developed. The Romer model has three important features. Firstly, technology progress experienced by the private sector stimulates capital investment, which induces the total economy's productivity. Secondly, the availability of research subsidies may encourage economic agents to expand the time spent doing research. Thus, economic growth is stimulated through the implementation of policies that support research investment. Thirdly, technology development induces the fixed costs of the firm to increase after the research costs are incurred. The designs accumulated from technology progress is utilized by the firms without incurring any additional cost. Therefore, technology incorporates the non-rival characteristics and the incentives for positive knowledge spill-overs grow (Verbič, Majcen, Čok and Ivanova, 2011).

These features create a monopolistic equilibrium with increasing return to scale. The human capital that the private sector dedicated to research gives rise to increasing the return to scale. Therefore, the increasing return to scale motivates the technological progress and the variation of physical stock available for consumer-good production. Consequently, Romer's framework stipulates that endogenous economic growth results from this development.

The Romer model emphasises that when the private sector distributes more human capital to research departments, the outcomes would be an expansion of technical designs, accumulated knowledge and the higher the number of total stocks of capital goods designed. Consequently, when the employed researcher is more productive, it induces a more robust and stable economic growth than before, than if the human capital was allocated to other departments (Dosi, Fagiolo and Roventini, 2010). Another significant point that was highlighted by the model is that nations with a higher total stock of human capital will experience higher stable growth than economies with a lower total stock of human capital. In summary, the productivity of labours and economic growth depends on the volume of human capital incorporated within each employee.

Blanco, Prieger and Gu (2013) assessed the influence of research and development on economic growth in USA states from 1963 to 2007. The results postulated that research and development stimulate economic growth and the production levels in all the states. However, the states that distributed a large portion of resources to research and development projects generated higher economic growth and were more productive compared to the states that allocated few resources. Bayarçelik and Taşel (2012) evaluated the impact of research and development on economic growth in Turkey with data spanning from 1998 to 2010. The results indicate that research development and expenditure on research development has a positive and significant impact on economic growth and innovation. Other studies that support Romer's growth theory are Beraldo *et al.* (2009); Mankiw, Romer and Weil, (1992); McCallum (1996) and Khan (2015).

According to Acs, Braunerhjelm, Audretsch and Carlsson (2009), prior to World War II, the volume of generated research in the United State's universities was small, and the federal government did not fund any academic research. However, World War II was the foundation of transformation in knowledge creation systems. The military challenges induced the government to increase heavily the expenditure on research and development. The relationship between government and universities became strong, and thus the government became a major source of funding for academic research. When the war ended, the number of people enrolled in universities increased and to enhance the economic activities, the war-related products were commercialised.

2.2.5.3: The Lucas Growth Framework

Lucas (1988) advocated education as a fundamental pillar of economic growth, which is both rival and exclusive, since the knowledge, skills, and intellectual is incorporated in people as human capital (Bosupeng, 2015; Christie, 2014; Rebelo, 1991). The Lucas model proposes that an economy that invests in education expands the production of human capital, which is paramount for growth progress. The Lucas approach makes a clear distinction between internal and external effects of human capital. The internal human capital can be expressed as knowledge or skills gained by an individual employee after undergoing training. Thus, the external effects are knowledge spill-over, the accumulation of productive capital and the various activities occurring within the economy. Investment in human capital is assumed to be a

determinant factor for technological development (Agénor, 2011; Azariadis, Chen, Lu and Wang, 2013).

The Lucas model postulates that each firm experience constant return to scale, but at the aggregate level, there are increasing returns for the whole economy. Thus, the concept of learning by doing and the spill-over effect incorporate human capital. Therefore, individual firms are anticipated to receive more benefits from the absorption of average human capital disseminated in the economy than by accumulating aggregate human capital (Lucas, 2009; Madsen, Saxena and Ang, 2010). Consequently, economic growth generated depends on the level of skills and knowledge distributed in the economy. According to Lucas (1990), technology is endogenously determined by firms through their investment decision, and technology is also considered to be public good available in the economy. Hence, firms are considered to be price takers and equilibrium is reached since the firms in the market are under perfect competition (Braunerhjelm *et al.*, 2010).

The model also predicts that labours have two choices: either work or enrol in the training programme. This suggests a compromise because a worker who embarks on a training programme forgoes part of their work income to enhance future productivity and raise wage rates (Agénor, 2011; Bell *et al.*, 2010). Thus, the higher productivity of training labours will stimulate the marginal product of labour, and also enhance the wage rate. Therefore, the incentive to train is greater to complement economic growth. Finally, the growth of human capital depends on how labours allocate their time between current production and human capital accumulation.

Adawo (2011) investigated the impact of human capital on Nigerian economic growth from 1970 to 2006. The results reveal that primary school input, health expenditure and physical capital formation stimulate economic growth but that secondary school input and tertiary enrolment are detrimental to economic growth. Tsai, Hung and Harriott (2010) empirically examined the contribution of human capital on economic growth in developed and developing countries. The GMM estimation results indicate that education and high-tech human capital have a strong influence on economic growth. Pelinescu (2015), Zhang and Zhuang (2011), Ljungberg and Nilsson (2009)

Confirmed the validity of the Lucas endogenous growth theory. Which suggest that investment in human capital through education investment and education attainment stimulates economic growth.

2.2.5.4: Barro's Growth Model

After Lucas (1988, 1990) and Romer (1986, 1990) put forward their explanation of endogenous growth, which viewed the accumulation of capital (human capital and physical capital) and technological progress as determinants of economic growth, Barro (1990) extended the framework by introducing government expenditure to the model. The Barro model propose that public and private returns on investment diverge, and externalities arise from research undertaken by firms (Chaudhary, Iqbal, Yasir and Gillani, 2009; Gupta and Barman, 2010).

Barro's model introduces a closed economy which incorporates households, government and competitive firms (private sector) as participating agents. The proposed framework adopts Rebelo's (1990) broad definition of capital, which incorporates human capital and non-human capital. Thus, investment in education and the training and expenditure of raising a child is considered to be human capital, while physical capital represents non-human investment (Irmén and Kuehnel, 2009). The co-movement of human capital and physical capital enhance growth, and the two variables are treated as complements in the production process. However, if human and physical capital are utilized separately, the production may indicate a diminishing return for each variable. The framework suggests only productive government expenditure, such as infrastructure investment, can stimulate growth, and that public investment is financed by the income tax collected from households and firms (Chude and Chude, 2013).

According to Barro's framework, the government is not involved in the production of goods and services therefore, purchase the flow of output from the private sector. The various productive services, provided by the government, correspond with the input variables that firms require in the production process. Thus, the government plays an important role in the economy, since it has a direct impact on production activities and stimulates the productivity of the existing capital stock in the private sector (Monteiro and Turnovsky, 2008).

The household is assumed to maximize its overall utility from its private consumption over an infinite time horizon, subjected to its budget constraint. The Cobb-Douglas production function is adapted to support Barro's explanation of endogenous growth, which adds the public sector to the basic growth model. The public services that the model accounts for are considered to be non-rival and non-excludable. Barro (1990) eliminated the prediction of the existence of externalities which arise from the use of public service. The parallel combination of the quantity of capital available to each producer in the private sector, and productive government expenditure, per worker employed in the production, determine the output. Constant returns to scale occur when the combination of quantity of capital available to each producer and productive government expenditure per worker is incorporated in the production process.

However, when the quantity of capital available to each producer and productive government expenditure, per worker, are employed separately, they exhibit diminishing returns. This occurs when public inputs fail to match the increase of inputs provided by firms. According to this framework, when flat-rate income tax is employed to finance public expenditure, the government runs a balanced budget, since the quantity of public services provided to household-producer equates revenue from tax and aggregate expenditure. With the assumption that the economy is always in a steady state, all the variables grow at an identical constant rate (Christie and Rioja, 2014).

Barro (1990) raised the following argument to link output and government infrastructure investment. Infrastructure spending can prevent diminishing returns to scale in the private sector capital and stimulate both marginal products of the firm's capital and growth of output. Conversely, in this case, government intervention through productive expenditure can promote economic growth only within limits and can also exhibit both negative and positive effects on growth. When the marginal product of government productive spending is below unity, a continual increase in tax rate is harmful to growth, as a result of tax effect being greater than capital productivity effect (Christie and Rioja, 2014).

Mura (2014) examined the influence of productive government expenditures on economic growth for six east European countries, with data spanning from 1990 to 2013. The empirical results revealed that government spending on education, infrastructure, research and development expenditures are positively linked to

economic growth. However, in this case, health expenditure has a negative impact on growth. Consequently, Barro's endogenous growth theory is valid for the six East European countries. Adefeso (2016) assessed the contribution of productive government expenditure on economic growth for 20 Sub-Saharan Africa countries, from 1980 to 2010. The GMM results postulated that productive government expenditure was negatively related to economic growth. The unexpected findings suggest that Barro's growth assumption is invalid for Sub-Saharan countries. Chu, Hölscher and McCarthy. (2018) concluded that a shift in government expenditure, away from non-productive government expenditure, and towards a productive form of expenditure, are associated with higher levels of growth in both high-income and low to middle-income economies.

2.3 RELATED EMPIRICAL LITERATURE

This segment shares an overview of the recent empirical literature applicable to the nexus between social expenditure and economic growth. The study starts by reviewing international literature, followed by empirical evidence from South Africa.

2.3.1 The International Empirical Evidence

The following section analyses the empirical evidence that describes the association between government social spending and economic growth at an international level. The first part introduces a combination of the variables that were adopted in various studies, which investigate the linkage between social expenditure and growth, at a broader scope. The second section represents the different methodological approaches that have been adopted as modelling techniques.

2.3.1.1 The Variation Variables Mix in Previous Studies

There are numerous variables that have been employed by different scholars to act as a proxy for social expenditure and growth, however, the determination of variables is entirely centred on the objectives of the study.

Khan and Bashar (2015) used health expenditure, education expenditure and social welfare expenditure as a proxy for social expenditure. The disaggregated expenditures and GDP per capita were from Australia and New Zealand and annual data, with 32 observations (from 1980–2012), adopted VECM as econometric modelling. Their findings suggest that all the social expenditures (education, health and social welfare) stimulate growth, while, for New Zealand, expenditure for health and welfare promote

the economic growth. The researchers concluded that disaggregated variables have a positive impact on economic growth for the two countries, and therefore recommended that governments must expand social programmes in order to promote growth.

Liu, Hsu and Younis (2008) investigated the linkage between government expenditure and economic growth at the aggregate and disaggregate levels, employing data from the United States of America (USA) from 1947 to 2002. Human resource expenditure variables, which represented social expenditures on education, social services, training, employment, social security and veterans' benefits, were included in the disaggregate model. The findings from the aggregate model are that unidirectional causality was identified that support the Keynesian framework and the result from the model of interest suggest that human resource expenditure is positively related to growth. Hence, the researchers suggested, in order for any economy to stimulate growth, its fiscal policy should increase social programmes that initially promote human resource development.

Similarly, Gurgul and Lach (2011) analysed the influence of public expenditure on economic growth at aggregate and disaggregate levels. The study conducted in Poland relied on quarterly data from Q1 of the year 2000 to Q3 2008. The social spending variables, that were expenditures on education, social security, culture, health and sport, were incorporated under the human resource category physical resource, other remaining budgetary expenditures, and net interest payment expenditure. These variables were employed in the disaggregated model. Real GDP growth represented economic growth in both estimations. The results from the causality analysis suggested that expansionary fiscal policy stimulated growth in the aggregate model, proving the validity of Keynesian theory, that disaggregates finding for linear causality analysis indicated that only net interest payment expenditure was positively related to growth, while the non-linear causality suggested that human resource expenditure and other remaining budgetary expenditure caused economic growth.

Chude and Chude (2013); Mallick and Dash (2015); Mariana (2015); Mercan and Sezer (2014) investigated how social expenditure on education spending affected economic growth. These studies employed different data frequency, estimation methodology and represented both developing economies and developed economies,

however, they arrived at the same conclusion: that public expenditure on education is positively related to economic growth. The findings corresponded to the theoretical framework put forward by Lucas (1988) and Romer (1990).

Other researchers, such as Beraldo *et al.* (2009) and Li and Haung (2009) Mura (2014), adopted government spending on education and health to analyse the causality relationship between social expenditure and economic growth. The empirical findings by Beraldo *et al.* (2009) and Li and Haung (2009) indicate a positive significant relationship between the variables, education and health expenditures stimulating growth. Mura (2014), who examined the nexus between productive government expenditures and economic growth, reported that education, infrastructure, and research and development expenditures are linked to economic growth for Kenya. However, health expenditure has a negative impact on growth, and consequently, the overall results suggest these social expenditure variables are important to economic growth. This also supports Barro's (1990) work, which suggests that productive government expenditure can spark economic growth.

2.3.1.2 Methodology Employed by Previous Studies

The following section expounds the applicable methodological approaches that have been employed in previous studies and highlights the studies that utilise time series data, panel or cross-sectional data, different econometric modelling from the single equation to multivariate estimations, data frequency and sampling techniques. The availability of data and the objectives of these studies determined their methodological approach.

Previous studies have employed time series techniques, investigating the relationship between social expenditure and economic growth (Afzal *et al.*, 2010; Bosupeng, 2015 Chude and Chude, 2013; Gurgul and Lach, 2011; Khan and Bashar, 2015; Kunu, 2015; Mallick and Dash, 2015; Mariana, 2015; Muthui *et al.*, 2013; Saad and Kalakech, 2009; Tamang, 2011). In contrast, Gurgul and Lach (2011) employed quarterly time series data while the other studies used annual data. However, panel and cross-sectional techniques have gain popularity, especially with developing countries (Blankenau, Simpson, Tomljanovich, 2007; Bose, Haque and Orsborn, 2007; Mura, 2014; Rodríguez-Pose and Ezcurra, 2011).

The panel data technique has gain popularity among the OECD countries. Bellettini and Ceroni (2000) examined the nexus between social security expenditure and economic growth by utilising cross-sectional data for 61 countries from 1970 to 1985 and panel approach for 20 OECD countries over 30 years (1960 – 1990). The results suggest a positive and significant relationship between the variables of interest. Beraldo *et al.* (2009) employed a panel approach of 19 OECD countries, from 1971 to 1998, to investigate the impact social expenditure on health and education to economic growth, the expenditures were both public and private. The findings suggest that both variables are positively related to economic growth, but public expenditure is more effective than private spending, which emphasises the importance of a government role in stimulating growth.

Similarly, Furceri and Zdzienicka (2011) used panel data, from 1980 to 2005, for OECD countries, to establish the existing relationship between social expenditure and economic growth. The results indicate that a 1% increase in social spending leads to an expansion of economic growth by 1%, hence social programmes are assumed to be co-moving with growth in the long run. However, the empirical results presented by Eggoh, Houeninvo and Sossou (2015) indicate that social spending has a negative impact on growth. The results contradict the findings from the presented panel models since they support the positive relationship between social spending and economic growth.

Mercan and Sezer (2014) employed the ARDL bound approach, which is the single equation cointegration approach to examine the long run relationship between education expenditure and growth, with annual data from 1970 to 2012. The empirical evidence from the Turkish study indicates that the positive significant relationship between the variables of interests, since the long estimation indicates that a 1% increase in education spending would expand growth by 0.30% rates which supports the theoretical framework of Lucas (1988, 1990).

The Johansen cointegration approach has been employed in recent studies (Bosupeng, 2015; Chude and Chude, 2013; Khan and Bashar, 2015; Kunu, 2015; Mallick and Dash, 2015; Saad and Kalakech, 2009 and Tamang, 2011). The method is developed under the VAR and VECM system, hence the Johansen test has the ability to detect more than one cointegration vector, which distinguishes it from the bound test and the Eagle and Granger methodology, which only show one

cointegration relationship between the variable. Muthui *et al.* (2013) tested the long run analysis between a component of government expenditure and economic growth adopting the VECM modelling. The outcome from the 47 observations (from 1964 – 2011) suggests that disaggregated government expenditures on education, order and security, and health are positively related to economic growth but government expenditure on defence has a negative relation to growth.

2.3.2 South African Empirical Evidence

No scholarly attention has been paid to the association between disaggregated social spending and economic growth. Therefore, the following section represents empirical evidence that shows the relationship between government expenditure and economic growth at the aggregate level.

Ziramba (2008) examined the validity of Wagner's law data annual date spanning from 1960 to 2006. The ARDL bound approach and Granger causality test were employed. The Bound test indicates the existence of a cointegration relationship between government spending and economic growth. While causality results suggest bi-directional causality, both variables Granger caused each other in the short run. However, no causal relationship was identified in the long run. Menyah and Wolde-Rufael (2012) followed Ziramba's (2008) study by assessing the validity of Wagner's Law using time series annual data from 1950 to 2007. The VECM was the modelling approach chosen for this study. The Dynamic Ordinary Least Squares (DOLS), Ordinary Least Squares (OLS), Fully Modified Ordinary Least Squares (FMOLS), Maximum Likelihood (ML) and ARDL were also used to estimate the cointegration relationship between government expenditure and real GDP. The causality analysis demonstrates that long run economic growth stimulates government spending, supporting Wagner's law, while the five cointegration estimators indicate a long run relationship between growth and government spending.

Furthermore, Chipaumire *et al.* (2014) empirically examined the nexus between public spending and economic growth, employing quarterly data spanning from 1990 to 2010. GDP was used as a dependent variable, while aggregate government expenditure, money supply and investment were independent variables. Johansen's cointegration test was employed to check the cointegration of variables and the Vector Error Correction Model (VECM) was used as econometrics modelling for the study. The

findings contradicted with the Keynesian assumption since government spending is negatively related to economic growth. The expansion of government spending by 1% caused economic growth to decline by 6.5%.

Odhiambo (2015) examined the influence of government spending on economic growth, over the period from 1970 to 2013, using annual time series data for income per capita, aggregate government expenditure and unemployment included as an intermittent variable. The ARDL model was the econometric approach employed to model the relationship. The findings revealed a unidirectional causality relationship during the long run, moving from economic growth to government spending. However, in the short run, government spending caused economic growth.

Furthermore, Chirwa and Odhiambo (2016) investigated the factors influencing economic growth in South Africa, from using data from 1970 to 2013. The results from the estimated ARDL model indicated that gross fixed capital formation (GFCF), inflation rate, population growth, international trade, government consumption, human capital and real exchange rate have a significant impact on real GDP per capita. The short run results reveal that only investment (GFCF) was positively linked to economic growth. However, during the long run international trade, investment (GFCF) and human capital variables stimulated economic growth, while the remaining variables caused growth to decline.

Leshoro (2017) investigated the nexus between government spending and growth in South Africa with 39 observations (1976 – 2015), employing the ARDL technique. The endogenous variable was presented by the growth rate of real GDP. The results suggest that the government expenditures, investment and consumption, have a positive and significant impact on growth in the short run. However, during the long run, only government investment has a significant impact on economic growth. Keho (2015) analysed the validity of Wagner's Law for 10 African countries, using annual time series for real per capita GDP and aggregate government expenditure as a percentage of GDP. The study adopted the frequency domain causality approach. The finding revealed that government expenditure determines economic growth in South Africa, Gabon and Senegal. While the validity of Wagner's law is confirmed in Nigeria, Cameroon and Ghana. The result from Burkina Faso, Kenya and Cote d'Ivoire,

however, indicated that there is no association between government expenditure and economic growth.

The international studies, which are analysed by the present work, have outlined the nexus between social expenditure and economic growth. Thus, most empirical studies adopted disaggregated measurement. Consequently the most disaggregated social spending variables used were on education, health, social welfare (Beraldo *et al.*, 2009; Bosupeng, 2015; Chude and Chude, 2013; Khan and Bashar, 2015; Li and Haung, 2009; Mariana, 2015; Mura, 2014) The studies were diversified, considering the variation on methods utilised from time series data, panel or cross-sectional, to the single equation to multivariate estimations. The overall international evidence suggests that government expenditure on social programmes stimulates growth. However, it is noteworthy to understand that the majority of the studies have employed the multivariate techniques, which provide robust results for large size sample.

Most of the empirical literature available in South Africa is presented at the aggregate point of view. This aggregation bias makes it impossible to conclude on the impact that each government spending component has on economic growth. Therefore, the present study will explore this gap, and will employ a disaggregated measure of government spending, thus, investigating the effect that disaggregated social expenditure have on economic growth. The disaggregate approach will provide a clear idea of how government social spending individually affects economic activities, and whether government investments in education, health and social protection programmes assist to generate economic growth and the national development plan required to create 11 million jobs by 2030. Also, the study is motivated by the Keynesian theory, which emphasises the significance of government intervention in the economy. The study also uses the ARDL modelling approach since it provides robust results for small sample size.

2.4 CONCLUSION

Chapter two concerned the relationship between government social spending and economic growth. Section one outlined the applicable theoretical literature such as Classical view, Keynesian theory, Wagner's law, Solow model and the endogenous

growth theories. In conclusion, Keynesian and endogenous theories suggest that government spending is necessary for economic growth.

Section two presented international and domestically empirical evidence, respectively. The international empirical literature presents substantial evidence between disaggregate social spending and economic growth. However, the scarce empirical literature in South Africa relies on aggregate measurement. Therefore, to explore this missing information, the study uses disaggregate measure to investigate the relationship between government social spending and economic growth in South Africa.

CHAPTER THREE

THE CHANNELS THROUGH WHICH GOVERNMENT SOCIAL SPENDING IMPACT ON ECONOMIC GROWTH

3.1 INTRODUCTION

This chapter is separated into two sections, the first parts present the income distribution channel and the literature that best describes how government social spending is associated with income distribution. Section two presents the household consumption expenditure channel, which depicts how the government's social spending impacts on household consumption.

Government social spending on education, health and social protection channels economic growth through its impact on income distribution and household consumption expenditure. The following triangular diagram illustrates the interaction between economic growth, income inequality and household consumption expenditure.

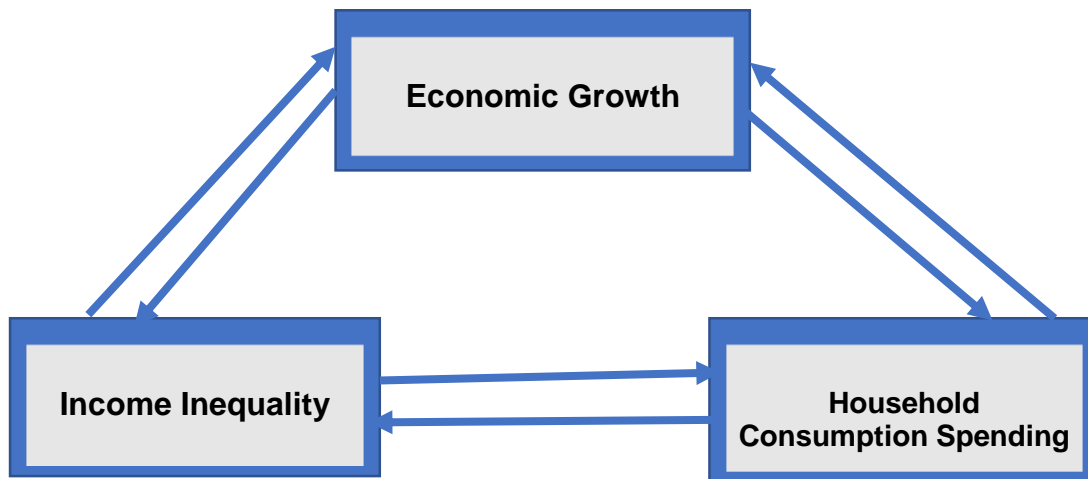


Figure 3.1: The Economic Wellbeing Triangular

Source: The Researcher

The role of government social spending in economic wellbeing indicates the existence of both a direct and indirect relationship. For example, when government social spending reduces income inequality (direct), it means indirectly that social spending will have a positive impact on economic growth and household consumption

expenditure. However, if government social spending causes income inequality to increase (direct impact), this would mean income inequality has a negative indirect impact on economic growth and household consumption. According to Barro (2000), income inequality distorts economic growth, and when government social spending stimulates household consumption spending (direct impact), it means an indirect impact on economic growth and income inequality. The Keynesian framework indicates that government spending can stimulate economic growth through its impact on aggregate demand (increasing household consumption expenditure) and income per capita.

When government social spending enhances economic growth (direct impact), it suggests that it has an indirect impact on income inequality and household consumption. According to Kuznets hypothesis, a rise in economic growth has a negative effect on income inequality. Thus, economic growth stimulates production, investment, employment and increase aggregate demand (aggregate consumption).

3.2 INCOME DISTRIBUTION CHANNEL: INCOME INEQUALITY AND GOVERNMENT SOCIAL SPENDING

The first sub-section presents literature that reviews the impact of government social spending on income inequality. The second sub-section outlines other factors that contribute to the variation in income inequality.

3.2.1 The Political Economy

The political economy framework states that the association between fiscal policy and income inequality is based on the median voter hypothesis under democratic settings. According to this theory, in a more unequal society, where the mean income is higher than the median income, the majority of people tends to choose more redistribution of resources from rich to poor through the voting process (Meltzer & Richard, 1981). Therefore, higher income inequality promotes the expansion of government expenditure. The people under the poverty line normally benefit from the distributive programmes, then lose income via taxes levied on them to finance that expenditure, whereas it is the opposite for the wealthy. The central assumption for this framework is that the preferences of the median voter are considered in the political process under the under-majority role and that taxation is progressive.

Government redistributive policies are positively linked to higher income inequality. Finseraas (2009) investigated the validity of Meltzer- Richard model redistribution using 22 European countries. The findings suggest that a positive link between higher income inequality and government redistribution spending. Consequently, the results support the theoretical framework of Meltzer and Richard (1981). While the work of Benabou (2000) indicate that higher income inequality is associated with less redistribution government spending, as a result of positive externalities to redistribution.

The political economy model underlines that the size of government redistribution programmes depends on the degree of inequality within a society. Therefore, the more unequal the society, the higher is the demand for redistribution programmes by the median voter. This assumption proposes the existence of a positive relationship between fiscal policy and inequality. However, the current study is interested in the opposite effect, of how redistributive policy impacts on the wellbeing of the people. Thus, the study investigates the impact of government social spending on income inequality in South Africa.

3.2.2 International Empirical Evidence

Niehues (2011) examined how social spending impact on income inequality in 24 European countries between the years 1960 to 2007, using the GMM modelling technique. The findings indicated that most of the disaggregated social spending employed (such as unemployment benefit expenditure and public pensions spending) reduces income inequality. However, the targeted benefits were positively linked with income inequality. Foster (2012) also investigated the nexus between government social spending and income inequality in 35 OECD countries using panel analysis. This study employed social spending, and globalization as determinants of income inequality. The results indicated that in developed countries social spending on education, social security and health and trade openness have an equalizing effect on income distribution. While FDI promotes the expansion of inequality. However, in less-developed countries, only social expenditure on education and health promote equality. Whereas social security is positively linked to income inequality. Thus, the results of globalization are inconsistency since some stage trade and FDI are beneficial to other areas, but harmful to others.

Anderson, D' Orey, Duvendack and Esposito (2017) indicated that government social spending has an equalizing effect on income distribution. The study employed aggregated government spending and disaggregated expenditure on social welfare, education, housing, health, consumption, and the military as the determinant of income inequality for Sub-Sahara Africa (SSA), Latin America (LAC), East Asia and Pacific (EAP), South Asia (SA), Middle East and North Africa (MENA), Eastern Europe and Central Asia (EECA). The meta-regression analysis, based on a total 84 separate studies, containing over 900 estimates, suggests a strong negative relationship between government expenditure and size of income inequality. Claus, Martinez–Vaquez and Vulovic (2012) evaluated the association between government fiscal policies and redistribution in Asian countries, employing panel techniques for 150 for developed and developing economies from 1970 to 2009. The empirical analysis is compared to the rest of the world. According to the results, government spending on social protection is positively linked to income inequality in Asian, however, reducing income inequality from the rest of the world. Government expenditure for both education and health have an equalizing effect on income distribution in both Asia and the rest of the world, while government spending on housing promotes income inequality in Asia, but reduces inequality in the rest of the world.

The empirical evidence generated by Sylwester (2002) indicates that government education expenditure promotes equality. Karim (2015) found that public education expenditure has an equalizing effect on income distribution for Bangladesh. However, the higher income group benefits more from public education expenditure, although government programmes are targeted at poor people. Ospina (2010) also found that government social spending on education and health has an equalizing effect on income distribution in Latin America, but social security spending is positively associated with income inequality.

D'Agostino, Pieroni and Procidano (2016) examined the nexus between welfare expenditure and income inequality, employing panel modelling of 21 OECD countries from 1995 to 2010. The welfare expenditure variables were represented by health, pension, survivors, unemployment, family, disability and housing. The results indicate that there is a negative relationship between government welfare spending and income inequality, and a 1% increase in welfare expenditure which decreases the Gini

coefficient by half a percentage. Wolff and Zacharias (2007) evaluated the association between government redistribution spending and the household economic well-being in the United States, covering the period of 1989 to 2000. The findings suggest that government transfers, consumption and taxes have an equalizing effect on income distribution in the United States.

Agnello and Sousa (2014) examined the effects of fiscal consolidation on income inequality employing a panel of 18 industrialized countries from 1978 to 2009. The results suggest that the 18 economies became even more unequal during the periods of fiscal consolidation, while the rise in tax tended to have an equalizing effect on redistribution income. Afonso, Schuknecht and Tanzi, (2010) reported that the redistribution of income by the government is positively correlated with quality education achievements and creates equality in society, while Anderson *et al.* (2017); Mehmood and Sadiq,(2010) and Ospina (2005) reported a negative relationship between income redistribution (through government expenditure) and income inequality, and that the expansion of redistribution policies and social spending reduces poverty and inequality.

3.2.3 South African Empirical Literature

Schiel, Leibbrandt and Lam (2014) investigated the influence that social grants have on inequality in South Africa, employing national household surveys from 1993 to 2008. The results indicated that the old aged social grants are negatively associated with poverty, and unsuccessful in reducing income inequality, while the social assistance received by childminders had an equalizing effect on income distribution. Armstrong and Burger's (2009) empirically investigated the relationship between social grants, inequality and poverty in South Africa, employing the Income and Expenditure Survey of 2005 (IES2005), the General–Entropy (GE) and Foster–Green–Thorbecke (FGT) techniques. The results suggest that social grants reduce poverty but they have an insignificant impact on inequality.

3.2.4 Income Inequality and Other Factors

The previous empirical literature suggests that apart from government spending, there are various factors that impact on income inequality such as:

- **Economic development** is presented as a determinant of inequality. Kuznets (1955) stated that the size of income inequality is determined by the stage of

economic development. The association between economic development and income inequality can be presented in inverted U-shape. During the early stages of development (industrialization) income inequality is higher, however, it decreases with further development. Empirical studies, such as those by Zhou and Li (2011); Khalifa and El-Hag (2010); Shahbaz (2010); Chen (2007) and Lee (2006), have proven the validity of Kuznets' hypothesis.

- **Globalization** is considered to have a significant impact on income inequality around the world. According to the Heckscher-Ohlin trade model, if a nation has a majority of low skilled labours, that nation will experience an increase in the relative wage of unskilled labours and, as a result, the wage inequality falls. However, if trade transmits the skilled-biased technological change to developing economies, then the rise in trade openness will induce higher wage inequality by increasing the demand for more skilled labours in the labour market. According to Asteriou, Dimelis and Moudatsou (2014), globalization through trade openness is negatively linked to income inequality, but the foreign direct investment is positively related to income inequality. Meschi and Vivarelli's (2009) findings suggest that trade openness increases income inequality.
- **Urbanization** is among the determinants of income inequality. The growth of an urban population indicates the expansion of the middle-class group with better employment and higher income per capita. Consequently, urbanization can be observed through the movement of labour from the agriculture sector to the industrial sector. The rise in urbanization is expected to decrease income inequality. Lee, Cheong and Wu (2017); Chen, Glasmeier, Zhang, and Shao (2016) and Liddle (2017) found that the growth of the urban population has an equalizing effect on income distribution. According to the political economy framework, the size of government redistribution programmes is normally higher for more unequal societies, especially in democratic regimes (Lee and Lee, 2018).
- **Democracy** is proposed to be negatively linked to income inequality. However, Huber, Pribble and Stephens (2004) found a positive link between democracy and income inequality in Latin America, while Ospina (2010) found no significant relationship between democracy and income inequality.

- **Population** growth is associated with higher inequality. The aged population and the population below 15 years are normally expected to expand the size of inequality (Ospina, 2010; Huber *et al.*, 2004). The proposed argument is that old people tend to save less, and withdraw from the labour force and an excess of unskilled young labourers depress lower income and increase wage differentials.
- **Inflation** also influences the distribution of income in an economy. Higher inflation normally reduces the real wage. According to Easterly and Fischer (2001), inflation normally reduces both the share of the bottom quintile and the real wage, and thus causes income inequality to increase. Albanesi (2001) stated that inflation is a tax on cash balance, which tends to be harmful to poor individuals since they usually hold their wealth in liquid assets, thereby stimulating inequality.
- **Education** is essential to all growth driven economies. When the degree of education attainment rises within the population and stimulates human capital, it is expected to promote economic development. Therefore, education has an equalizing factor in income distribution (Coady and Dizioli, 2017). However, when education attainment is unequally distributed among the population, it induces income inequality to increase. Education inequality is positively associated with income inequality. According to Rodríguez-Pose and Tselios (2009), higher levels of inequality in educational achievement are linked with high-income inequality.

Abdullah, Doucouliagos and Manning (2015) investigated the impact that education has on income inequality using meta-regression analysis. The results suggest that education has a different impact on top earners' share and on low earners' share. Education reduces the income share of top earners and stimulates the share of the bottom earners. The overall results suggest that education is very effective in stimulating income equality in Africa. The relationship between government social and income inequality is well researched at an international level. However, the little research that has been conducted in South Africa focuses on the impact that social grants have on the welfare of people, while there are other components of government social spending that impact on the well-being of society. The present study closes this empirical gap by employing disaggregate data for government social spending, which

concerns education, health, and social protection, to determine its impact on the welfare of South African citizens. The study utilises the Gini coefficient as a measure of income inequality. According to the researcher's knowledge, the impact of disaggregated government social spending on income inequality in South Africa has not been empirically assessed. This empirical relationship was estimated using the ARDL approach. The results generated from the study show whether disaggregated social spending impact on South African economic, through its contribution to income distribution and the indirect impact on economic growth and household consumption.

3.3 HOUSEHOLD CONSUMPTION EXPENDITURE CHANNEL

According to the Keynesian framework, the government can use expansionary fiscal policy to stimulate aggregate demand during a recession, through the multiplier effect, which stimulates aggregate investment, productivity, employment and income per capita, leading to an increase in aggregate household consumption spending. Consequently, government spending has a significant impact on the variation in household consumption expenditure and economic growth. The first part reviews previous literature, which shows how government social spending influences household consumption expenditure. According to literature, there are other variables, besides government expenditure, which have a significant impact on household consumption. Therefore, the second part depicts other factors that determine the size of household consumption from a theoretical literature perspective.

3.3.1 International Empirical Evidence

Zheng and Zhong (2016) assessed the link between social protection and rural household expenditure in China using a survey with a sample containing 47 pilot counties, covering the period from 2009 to 2010. The rural household consumption increased by 1–3% and agriculture investment by as high as 6–9% in the pilot counties. The results also suggest that pensions mainly affect the households with old age members and the poor families and the savings rate was not changed by the pension, which supports the more contingent income than a life-cycle hypothesis.

Khan, Khan, Chaudhary and Fedorova (2015) empirically examined the impact of government spending on private consumption in China, using time series data with 28 observations (1985–2013). The ARDL was employed as an econometric modelling

approach. The results suggested that aggregate government expenditure has a positive effect on private consumption. Thus, government spending is a significant instrument to stimulate aggregate demand in China. Nieh and Ho (2006) investigated whether expansionary fiscal policy through expenditure crowds out private consumption for 23 OECD countries covering the period of 1981 to 2000. The panel empirical analysis suggests that an increase in government expenditure does not crowd out private consumption. Thus, the findings justify the Keynesian plea for expansionary fiscal policy.

Barrientos (2012) proposed that social transfer can boost household consumption and asset security since the grant creates an opportunity for the less-privileged to adopt various strategies to protect their consumption and assets. The conclusion was that social transfer programmes from the developing countries stimulate the production capacity of the poor and the poorest groups. Coady *et al.* (2010) reported that there is a positive linkage between government social expenditure and household consumption in their investigation in China. The findings of the study suggested that government social expenditure increases 1% in health, and education and pension would result in a $1\frac{1}{4}\%$ increase in household consumption. According to Barnett and Brooks (2010), the condition of the government system, especially the education, pension and health systems, plays a major role in household consumption. When it is underdeveloped, the people will have high precautionary savings to deal with the high costs for health, education and retirements. Hence, the household savings and household consumption expenditure act as substitutes to each other; when the savings increase, automatically, the household consumption decrease.

Schclarek (2007) studied the impact of fiscal policy on private consumption in 19 industrial and 21 developing countries, using annual data from 1970 to 2000. The employed variable was household final consumption expenditure, government final consumption spending, household disposable income, population, government external debt and fiscal deficit. The results suggest that government expenditure shocks have a high Keynesian effect on private consumption expenditure. However, the Keynesian effect is greater in developing countries than in industrial countries.

Heppke-Faik, Tenhofen and Wolff (2006) empirically evaluated the fiscal policy impact on the German economy, employing the SVAR approach. The results indicate that a rise in government spending stimulates output and private consumption. Ho (2001)

investigated the response of private consumption to shocks in government spending for 24 OECD countries, with annual data from 1981 to 1997, employing panel DOLS as a modelling technique. Thus, the findings suggest the existence of crowding out. Tagkalakis (2008) empirically analysed how private consumption responds to government intervention during recession and expansion, for 19 OECD countries. The investigation examined the period from 1970 to 2002. The findings suggest that fiscal policy is more effective in stimulating private consumption during the recession than in an expansion phase.

3.3.2 South African Empirical Evidence

Owusu-Sekyere (2017) empirically investigated how household consumption and household credit respond to shocks in monetary policy in South Africa. The study used quarterly data from 1994Q1 to 2012Q4 and employed vector autoregressive and time-varying parameter vector autoregressive as modelling techniques. The results indicate that both household consumption and credit decline and remain negative before inflation targeting and after inflation targeting. However, they rise during the global financial crisis, which induces expansionary policy.

Sekhampu and Niyimbanira (2013) examined the determinants of household expenditure in the South African township. Questionnaires were used to collect household data from Bophelong township during 2012. The results indicated that household income, educational attainment of the household head, household size, employment status and the number of people who are employed have a positive and significant impact on the household expenditure. The marital status of the household head was negatively linked to household expenditure. The age and gender of the household head had no impact on the variations of household expenditure. According to the findings, the socio-economic variables have a strong impact on household expenditure.

Sekhampu (2012) evaluated the factors affecting household food expenditure among households receiving government social grants in South Africa. The Bophelong township was chosen as the area of study, in 2012, and questionnaires were used to collect household data. The findings indicated that social grants received per household, the age of the household head and household size, stimulate household food expenditures. The results for educational attainment, marital status, gender and

employment status of the household head did not cause any variation in household expenditure.

3.3.3 Household Consumption Expenditure and Other Variables

According to literature, apart from government spending, there are other factors which have a significant impact on household consumption expenditure. This subsection reviews the applicable literature from the Keynesian absolute income framework, Permanent income hypothesis, life-cycle hypothesis and the relative income hypothesis.

3.3.3.1 Absolute Income Hypothesis

Keynes's absolute income hypothesis postulates that income received by households determines the consumption plan. The aggregate household current consumption depends on the current disposable income (Wang, 2011). Therefore, when disposable income rises, household consumption will also increase, but not to the same extent. According to this framework, the positive association between aggregate consumption and disposable income implies that the propensity to consume depends on the aggregate disposal income (Yazdan and Sina, 2013). When disposal income continues to increase, the average propensity to consume decreases. The marginal propensity to consume for households may vary depending on the type of income, for example, if the household source of income is government transferred then this would induce higher marginal consumption compared to income earned (Alimi, 2013).

Bakri, Rambeli, Hashim, Mahdinezhad and Jalil (2017) examined the determinants of household's consumption expenditure in Malaysia, from 1970 to 2014. The study employed the ordinary least squares (OLS) technique and the variables of interest were household consumption spending, household income (disposal income) and the inflation rate. The results indicate that household income has a strong positive impact on household consumption expenditure, while inflation reduces household consumption expenditure. The results verify the validity of the absolute income hypothesis proposed by Keynes. De Bonis and Silvestrini (2012) suggested that disposable income is the most dominant factor in affecting household consumption. Previous empirical evidence, by Chen, Guo and Zhang, (2010); Wang (2011), Diacon and Maha (2015), also support the absolute income hypothesis. The work of Alimi (2013) suggests that the absolute income hypothesis is invalid in the case of Nigeria.

3.3.3.2 The Permanent – Income Hypothesis

Another framework that explains the consumption household is known as Permanent –Income Hypothesis (PIH), which was pioneered by Milton Friedman during the 1950s. The theory suggests that current consumption is driven by current disposable income, however, it is important to know whether the income is expected to be permanent and transitory (Alimi, 2015; Altunc and Aydin, 2014). They further postulated that household total income incorporates permanent income and transitory income. The permanent part represents the income which households expect to be earned over their working life (also referred to as wealth) and is positively associated with an investment in human capital. Consequently, the more educated and trained and healthier the labourers, the higher is their permanent income (Gupta and Ziramba, 2011).

Transitory income is not expected to persist. It can be a chance occurrence and random phenomena, and it can be overtime income. According to Friedman, household consumption incorporates the same features as income, both permanent and transitory. A permanent consumption plan depends upon a permanent income generated by the household, while transitory consumption is influenced by the entire income received by people (Palley, 2010). The permanent income hypothesis states that household consumption depends primarily on permanent income since when people encounter transitory changes in their income, they utilize their savings and borrow to smooth consumption. Hence, the fraction of permanent income that is consumed depends on the following:

- The consumers' preference for future consumption compared to current consumption.
- The opportunity costs of current consumption.
- The uncertainty about future needs and wants.

Nwala (2010) evaluated the validity of the permanent income hypothesis in six African countries from 1960 to 2005. The study employed the modified Dickey-Fuller (GLS) unit root test and Fully Modified Ordinary Least Squares (FMOLS) technique. The results suggest that permanent income stimulates household consumption, in Ghana,

Nigeria, South Africa, Cameroon and Senegal, while the permanent income hypothesis is invalid for Kenya. Empirical evidence, such as that offered by studies of Alimi (2015); Altunic and Aydin (2014), and Osei-Fosu, Buntu and Osei-Fosu (2014), verify the validity of the Permanent income hypothesis. Other studies, such as that by Khan and Nishat (2011); Wang (2011); Yazdan and Sina (2013), Gupta and Ziramba (2011), suggest the invalidity of the permanent income hypothesis.

3.3.3.3 Life– Cycle Hypothesis

Ando and Modigliani (1963) opposed the views that household consumption decision entirely depended on the disposable income, by proposing that consumer's behaviour is determined by the lifetime resources. Therefore, household wealth and the value of future earnings are essential to the life cycle hypothesis (Alimi, 2013). This approach has three stages and also inter-link with employment. Firstly, the initial labour income earned by household increases in the early stages of the life – cycle. Secondly, as the worker's working years mature, the income becomes constant. Lastly, income drops at retirement, which is stage 3. Individuals want to maintain their current standard of living (measured by their consumption pattern) which may be changed by the variation of their income and the retirement stage. Therefore, the assumption is that people will distribute their earnings in a manner that makes it possible for them to maintain a constant flow of consumption through their lifetime (Palley, 2010).

The household savings is expected to be higher during the early stages of life –the cycle in order to assist people to maintain their standard of living when they do not receive any income. Consequently, savings make it possible for people to maximize their utility over the years (Jappelli, 2005). The degree of marginal propensity to consume for the household depends on interest rates, preferences and consumer's age, the expansion of household wealth and the distribution of income through the life-cycle depends on the interest rate. There exists an inverse relationship between current consumption and interest rate, an increase in interest rate induce the aggregate consumption to reduce while stimulating savings and future consumption (Blau, 2008).

Leszkiewicz-kędzior and Welfe (2012) investigated the validity of the life cycle hypothesis in Poland data from 1970–2008 and concluded that the life cycle hypothesis in Poland is legitimate. Empirical evidence generated by Bazhenova and

Krytsun (2013) indicates the invalidity of the life cycle hypothesis. The empirical results of Blau (2008) and Hurst (2008) suggest that at retirement the household consumption decreases. Which is contrary to the life-cycle hypothesis, that state that individuals will distribute the earnings in a manner that allows them to maintain a constant flow of consumption through their lifetime. This is known as the retirement consumption puzzle.

3.3.3.4 The Relative Income Hypothesis

Duesenberry (1949) challenged the Keynes' absolute income theory by suggesting that household consumption model must also incorporate psychological factors which are associated with habit information and social interdependencies based on relative income concerns. Therefore, the household's consumption cannot be determined by current income disposable alone (Sanders, 2010). But other factors such as current income relative to the highest level of income earned previous and relative to the income of other households have a significant impact on household consumption (Khan *et al.*, 2015). When income declines household find it difficult to adjust to change by lowering the standard of living or decreasing the spending level, hence the asymmetrical household consumption behaviour is known as the ratchet effect. Therefore, household resorts in increasing borrowings or reducing previous savings (Brown, Gray & Roberts, 2015). Meanwhile, the increment of income above its previous peak induces consumption to adjust this change.

Khan *et al.* (2015) empirically examined the validity of relative income hypothesis using income and consumption of farm households in district Peshawar, Pakistan. The study collected data using a survey for two selected villages and 300 households were randomly chosen. The results suggested that household current level of income, social status, the education of household head and size of the family has a strong positive impact on household consumption, while the age of the household head was negatively associated with household consumption. The overall results confirm the validity of the relative income hypothesis. Alimi (2015) showed that Kenya confirms the relative income hypothesis.

The international community has presented substantial empirical literature on the influence that government social spending has on household consumption expenditure. However, there is little empirical literature that evaluated the

determinants of household consumption expenditure in South Africa, and it focuses on the impact that socio-economic variables and social grants have on household consumption expenditure in townships. Even the study that employed social grant as a determinant variable is biased because its focus is on the specified study area and cannot be used to draw a conclusion about the wellbeing of South Africans. Government social spending on education and health is expected to stimulate household consumption expenditure, because of its influence on human capital.

According to the researcher's knowledge, no study has been conducted to examine the impact of disaggregate government social spending on household consumption expenditure. Therefore, the current study will close this gap by investigating the impact of disaggregate government social spending (education, health and social protection) on household consumption in South Africa. The results will show whether government disaggregated expenditures are able to improve household consumption and indirectly stimulates economic growth and income distribution. Therefore, to determine this relationship the study employs the ARDL modelling technique.

3.4 CONCLUSION

Chapter three reviews the distribution and consumption channels, with section one dealing with the related literature on the relationship between government social spending and income inequality. The international studies provide extensive evidence between disaggregated social spending and income inequality. The few South Africa studies have focused on the impact of government Social protection spending on income inequality. Thus, motivating this study to investigate the impact on disaggregate social spending on income inequality. Section two depicts the applicable literature on the government social spending and household consumption expenditure relationship. With the consumption theoretical framework.

Therefore, numerous studies investigated the empirical relationship at an international platform. Few studies were conducted in South Africa, and most assessed the impact of socio-economic variables and social grant on household consumption expenditure. Thus, the lack of empirical evidence on disaggregate social spending motivated this study. In conclusion, this chapter highlights the importance of empirically examining the impact of disaggregated social spending on income inequality and household consumption.

CHAPTER FOUR

GOVERNMENT SOCIAL SPENDING IN SOUTH AFRICA

4.1 INTRODUCTION

This chapter presents the transformation of government social spending in South Africa. Social spending is defined and followed by socio-economic problems, which have a significant impact on the expansion of government social spending. The last part explains how the policies that the government implements causes variation in disaggregated government spending.

4.2 DEFINITION OF SOCIAL SPENDING

According to OECD (2007), social spending is defined as the provision of benefits and financial contribution provided by the government and private institutions, aimed at stimulating citizens' standard of living during adverse situations which deteriorates their wellbeing. Social spending can be a direct payment for specific goods and services or transfer. The transfer circulating between households are excluded from the social domain since benefits extracted from institutions are included in social spending.

Social benefits encompass social services and cash benefits, and incorporate expenditure on childcare, the disabled and the elderly, pension funds, social assistance transfers and during maternity leave. Consequently, expenditure or programmes to be accepted under the social domain must promote one of the various social objectives, and social programmes are required to incorporate inter-personal redistribution or compulsory participation. The World Bank proposes that social spending provides for benefits and administrative costs, such as social pension, cash assistance, school feeding schemes, unconditional cash transfer, conditional cash transfer and in-kind transfer. Bucheli, Lusting, Rossi and Amabile. (2012) proposed that social expenditure components are formed by the family allowance, education, housing community services, social security, food and health.

According to Khan and Basher (2015), social spending is a special type of government spending component that is developed to address social purposes. Consequently, social spending facilitates programmes which deal with unemployment, old age grants,

housing allowances, health care, disability-related care, family allowance and stimulates active labour market policies.

Furceri and Zdzienicka (2011) reported that social expenditure can be provided by the government and the private sector in the form of benefits and financial contributions, and the eligible parties include the households and individual who are victims of adverse situations which lead to a poor standard of living. According to Van Der Byl (2014), in South Africa's context, social expenditure includes spending on health, education and social development. Huber, Mustillo & Stephens (2008) reported that social expenditure is comprised of government spending on health, welfare, education and social security. This is a significant variable that governments utilize in order to stimulate the standard of living and human capital of their citizens, which in return induce economic growth.

Furceri and Zdzienicka (2011) suggested that social expenditure plays a significant role in contributing to the formation of human capital and physical capital, through spending on health, education and investment on infrastructure. According to Buracom (2011), social expenditure is a significant tool that governments employ to eliminate inequality and poverty. The study suggested that in democratic states social spending can be utilized in two ways: firstly, as a response to the changing socioeconomic demand of the society, and secondly, government officials (bureaucrats) expand the social programmes in order to benefit themselves. This explanation suggests that the society use their vote to demand social programmes (demand-side framework) while government officials utilized when campaigning for re-elections and to maximize their own self-interest (supply-side theory).

4.3 THE SOCIO-ECONOMIC CHALLENGES THAT EXIST IN SOUTH AFRICA

The racial segregation system that existed during the apartheid era in South Africa has been a significant determinant of the high-income inequality in the country. Even after two decades into democracy, the country still endures the repercussion of the apartheid era. According to StatsSA (2017), the aggregate income per capita Gini coefficient (a measure of inequality) has decreased from 0.72% in 2006 to 0.68% in 2015. However, when it's disaggregated by race income, inequality is higher for black people than white people, rising from 0.64 to 0.65 in 2006 and 2015, respectively. Coloured households are in second place with a decline from 0.60 (2006) to 0.58

(2015). For Indian and Asians, the inequality was constant at 0.56 for 2006 and 2015, respectively. The inequality of white South Africans is small compared to other groups, with a decline from 0.56 (2006) to 0.51 (2015).

The rise of income inequality is associated with the high unemployment rate, with many people living below the poverty line. Figure 4.1 illustrates graphically the annual unemployment rate from 1994 to 2017. The lowest rate of unemployment for the observed period is 16.9% in 1995, afterwards, it continually increases and reaches the second highest point of 27.2% in 2002. This is followed by a decline and then it reaches 22.5% in 2008, afterwards increasing persistently reaching the highest level of 27.5% in 2017. After the 2008 world financial crisis, South Africa's unemployment rate never declined but it continually increased, challenging the well-being of the people and economic growth.

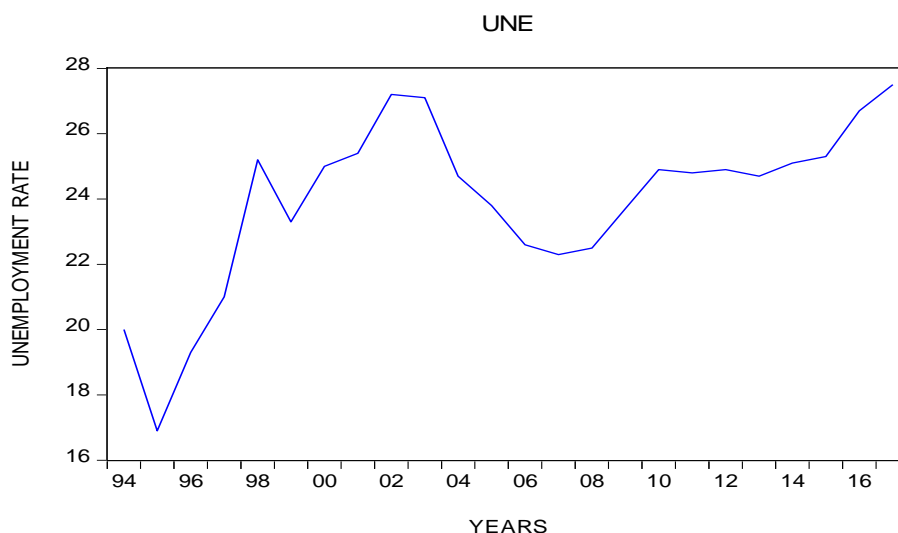


Figure 4.1: Unemployment Rate

Source: Generated in EViews 10, using South African Reserve Bank (SARB) (2016) data.

The higher, unequal distribution of income between the rich and the poor also contributes to the rise of the poverty rate among the majority of South Africans. According to StatsSA (2017), the poverty headcount is that 66.6% or 31.6 million people were living under the upper bound poverty line (UBPL) in 2006. However, between 2006 and 2011, the poverty line reduced to 53.2% and increased to 55.5% in 2015. These socio-economic problems have a destabilizing impact on the wellbeing of the people and economic growth. Therefore, over the years, the democratic

government has adopted numerous policies to stimulate economic growth and the standard of living for every South African.

4.4 SOUTH AFRICAN SOCIO-ECONOMIC AND MACROECONOMIC POLICIES

The democratic government implemented various policies as a countermeasure to socio-problems. These policies included the Reconstruction Development Programme (RDP), Growth Employment and Redistribution (GEAR), Accelerated and Shared Growth Initiative for South Africa (ASGISA), New Growth Path (NGP) and the most recent, National Development Plan (NDP).

The democratic government, led by the African National Congress (ANC), collaborated with non-government organizations (NGOs) to constitute the Reconstruction and Development Programme (RDP) framework in 1994. This socio-economic strategy was implemented to promote equality through the transformation of human resources, social protection and human settlements, and also creating a sound judicial system that protects every individual's rights, regardless of their race, gender or religion and promotes local production.

The RDP policy, however, failed to meet its target, especial in enhancing economic growth. The government then introduced the Growth Employment and Redistribution (GEAR) macroeconomic policy in 1996, to simultaneously increase economic growth and reduce inequality. To achieve the target, the framework proposed a sound fiscal and monetary policy, promoting economic growth, an increase of trade liberalization and foreign direct investment, government intervention in the labour market and an increase in the social infrastructure investment. The growth that arose from GEAR fell short with regards to reducing high unemployment. Consequently, the government introduced the Accelerated and Shared Growth Initiative for South African (ASGISA) in 2006. The main goal was to eliminate socio-problems and promote economic growth. The success of the ASGISA framework relied on the expansion of public infrastructure projects, the transformation of public administration, the tightening of monetary policy and the implementation of Broad-Based Black Economic Empowerment (BBBEE). Thus, the collaboration between government, civil society and the private sector to promote skill development was furthered. Under the ASGISA framework, South Africa recorded the highest growth of 5.60% (2006) since democracy in 1994. However, it

was unsuccessful in stimulating the wellbeing of the people, because of persisting socio challenges (Mcgrath and Akoojee, 2009).

Once again, the government introduced another policy, known as the New Growth Path (NGP) in 2010, which was based on job driver programmes, which planned to create 5 million employment by 2020. The employment opportunities were to be created through public infrastructure projects, and the partnership between government and major sectors such as manufacturing, mining, agriculture, construction and tourism, through integrating with modern technology and green economy, enhancing international trade, and stimulating regional integration and rural development.

Soon after, the National Development Plan (NDP) (2012) framework was introduced by the government to deal with the high inequality and poverty in South Africa and to stimulate economic growth. The NDP was built on a foundation of previous socio-economic and macro-economic frameworks, especially the New Growth Path. The long-term strategic plan of the NDP presented the solution in chapters, that in order to have full employment by 2030, the economy must grow by 5.4% annually. Economic growth and full employment depend on a society that is educated, innovative and healthy, which would be easily absorbed by the labour market. Consequently, a capable state is required to serve the citizens of South Africa equally, and transform the education and health systems. It was also aimed at the development of economic infrastructure, human settlements, rural economy, fighting corruption, and that the use of renewable energy would expand the opportunity to have 11 million jobs created in 2030 and a 6% unemployment rate.

The NDP was implemented in 2014, and the first five years is known as the medium-term strategic framework (MTSF), which would continue to 2019. The following stage would review the implementation period and if necessary, changes would be made and new programmes would be executed. For the few years that NDP was adopted it was ineffective in decreasing unemployment and inequality as GDP growth decreased from 1.7 % (2014) to 1.3 % (2015) (StatsSA, 2017).

The adoption of the above policies from RDP to NDP has contributed significantly to the transformation of government social expenditure in South Africa. Thus, the following sub-section reviews the progress of government social spending.

4.5 TRANSFORMATION OF GOVERNMENT SOCIAL SPENDING ON EDUCATION

The public education programme has transformed over the years through the implementation of RDP to the current policy of NDP. The central goal for all adopted frameworks was to develop human resource for less privileged groups, especially black people, females and the youth. Scholars such as Lucas (1988, 1990) and Romer (1986, 1990) and Barro (1990) considered government investment in education the best manner in which to boost economic growth. Figure 4.2 shows the growth of education expenditure from 1983 to 2015 and its response to policies adopted by the democratic government.

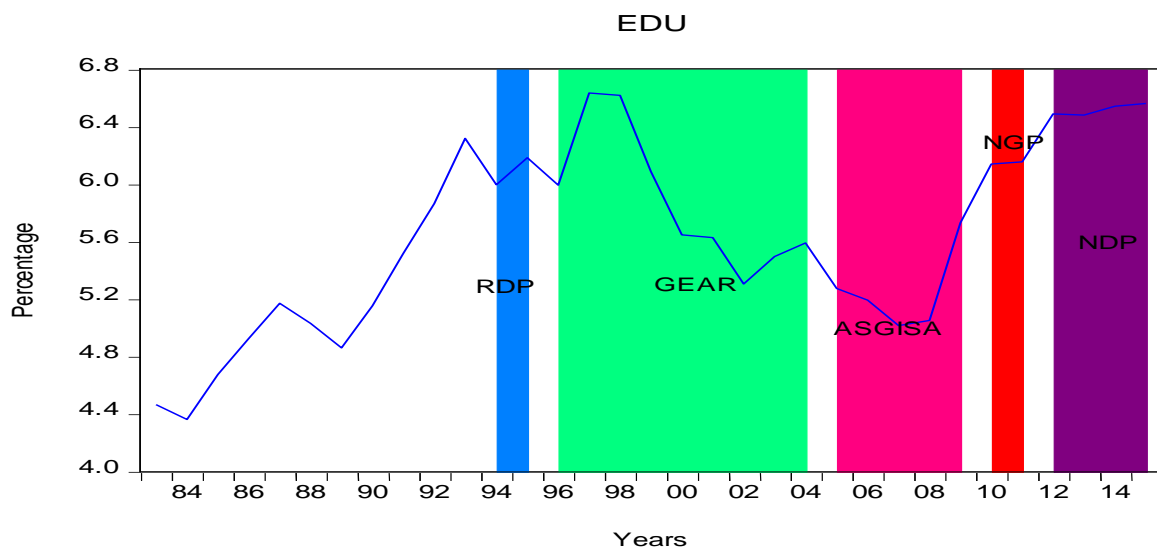


Figure 4.2: Public Education Expenditure as a Percentage of GDP

Source: Generated in EViews 10, using SARB (2016) data

During the 1980s, education expenditure as a percentage of GDP ranged between 4.5% and 4.86%, thus, in the 1990s, the upward trend is visible. When South Africa became a democratic state, RDP was implemented to deal with the socio-economic challenges. Therefore, in 1991–1995, the ratio of education expenditure to GDP was recorded at 4.8% and 6.19%, respectively. The government introduced the macroeconomic policy GEAR in 1996, and as a result, education spending as a percentage of GDP rose from 5.99% to 6.62% (1996–1998). There was a downward trend from 6.62% to 5.31% in 1999–2002 and an upward trend from 5.31% to 5.59% in 2002–2004. Under the ASGISA framework, education expenditure reported a downwards trend from 5.27% to 5.05% (2005–2008) and then an upward trend from

5.05% to 5.73% (2009). The growth rate of education expenditure declined during the ASGISA period, however, the change was positive, and these fluctuations may be explained by the world financial crisis of 2008.

When NGP was implemented, education spending (EDU/GDP) was upward trending from 6.14% to 6.16% (2010–2011). Education expenditure (EDU/GDP) continued to increase under the current socio-economic policy (NDP) from 6.49% to 6.56%. The overall growth of education expenditure has responded well to the implemented policies of the two decades of the transition period. The government, in 2006, abolished compulsory school fees in specified schools to accommodate less privileged households, and to boost the process of human resource development. Thus, by December of 2006, the department of education announced that 13 577 (48%) public schools were transformed to no-fee schools, giving 5 million learners the opportunity to receive a basic education. Over the years, no-fee schools increased from 60% in 2009 to 76% (20 322 schools) in 2011. In 2013, the enrolment level increased in public school to 11 975 844 learners enrolled in 24 136 public ordinary schools being taught by 391 829 educators. The changes in the education department contributed significantly to the variation in public education spending. The following table presents the public education budget over a period of five years from 2010/2011 to 2014/2015.

Table 4.1: Public Education Budget over Five Years

Types of Education Expenditure	2010/2011	2011/2012	2012/2013	2013/2014	2014/2015
Total Education Expenditure	R165.1bn	R189.5bn	R207.3bn	R232.5bn	R253.8bn
Tertiary Education	R23.3bn	R26.0bn	R31.3bn	R28.7bn	R29.9bn
Basic Education	R127bn	R154.5bn	R152.1bn	R164bn	R177.6bn
Education Administration	R9bn	R11.7bn	R9.6bn	R10.6bn	R12.3bn
FET and Adult Education	R5.7bn	R6.2bn	R14.4 bn	R20.1bn	R23.4bn
Recreation and Culture				R9.1bn	R10.6bn

Source: National Treasury (2016)

The education budget is disaggregated into tertiary education, basic education, education administration, FET (Further Education and Training) and Adult Education

and recreation and culture. Basic education expenditure was the highest of the other expenditures for the five conservative years. The amount for basic education was R127 billion in 2010/2011 financial year, increases to R154.5bn in 2011/2012, decreases to R152.1bn in 2012/2013, increase to R164bn in 2013/2014, and increases again to R177.6 billion in 2014/2015 financial year. While tertiary expenditure was the second highest. The budget for tertiary education was R23.3 billion in 2010/2011 financial year, increases to R26.0bn in 2011/2012, increases again to R31.3bn in 2012/2013, and decreases to R28.7bn and then increase slightly to R29.9 billion 2014/2015 financial year. Education administration costs are in the third position only for two years from 2010/2011 to 2011/2012, but from 2012/2013 to 2014/2015 FET and Adult Education became the 3rd highest education expenditure, pushing the administration costs to fourth place. The lowest expenditure was on recreation and culture expenditure. Hence, steady growth was recorded in total education expenditure over the period of review from R165.1billion (2010/2011) to R253.8 billion (2014/2015). The socio-economic challenges have induced government education programmes to expand, thus, emphasising the importance of economic development.

4.6 TRANSFORMATION OF GOVERNMENT SOCIAL SPENDING ON HEALTH

According to the National Development Commission (2013), HIV and AIDS pandemics have been the leading challenges to the healthcare system. In the period of 2000 to 2008, 700 000 deaths were recorded per year were recorded as a result of HIV and AIDS. The CIA World Factbook (2016) reported that South Africa has 7.1 million people living with HIV and is ranked number one in the world. The health department reported that communicable diseases, such as sexually transmitted diseases (STDs) and tuberculosis (TB), grow rapidly, imitating the HIV epidemic.

The majority of South Africans affected by communicable and poverty-related diseases live below the poverty line and rely on the state for health assistance aid. Consequently, the government has over the years expanded public health programmes to reduce such diseases and promote health in order to prevent and manage lifestyle diseases and reduce the non-communicable diseases by 28% in poor communities (National Development Commission, 2013). Therefore, public health spending is expected to rise over the years in order to reduce the health crisis in South Africa.

Table 4.2 represents the public health budget from 2010/2011 to 2014/2015.

Table 4.2: The Public Health Budget over Five Years

Types of Health Expenditure	2010/2011	2011/2012	2012/2013	2013/2014	2014/2015
Total Health Expenditure	R104.6bn	R112.6bn	R121.9bn	R133.6bn	R145.7bn
Provincial Hospital Services	R21.2bn	R23.7bn	R25.9bn	R26.4bn	R26.7bn
District Health Services	R34.5bn	R42.9bn	R42.3bn	R48.8bn	R52.3bn
Administration and other Health Services	R18.1bn	R17.1bn	R18.6bn	R16.4bn	R19.4bn
Central Hospital Services	R13.5bn	R10.5bn	R17.6bn	R10.9bn	R24.3bn
Health Infrastructure	R10.8bn	R10.3bn	R8.1bn	R10.2bn	R7.7bn
HIV/AIDS and TB	R6.5bn	R8.2bn	R9.5bn	R12.8bn	R15.3bn

Source: National Treasury (2016)

The disaggregated health expenditures are provincial health expenditure; district health services; administration and other health services; central hospital services; health infrastructure and HIV/AIDS and TB. The district health services expenditure is the highest for the five consecutive years. The amount of district health services was R34.5 billion in 2010/2011 financial year, increases to R42.9bn in 2011/ 2012, decreases slightly to R42.3bn in 2012/2013, increases to R48.8bn in 2013/2014 and increases again R52.3bn in 2014/2015 financial year. The second highest health expenditure is provincial hospital services. Therefore the budget for provincial hospital services was R21.2bn in 2010/2011 financial year, increases to R23.7bn in 2011/2012, increases again to R25.9bn in 2012/2013, also increase to R26.4bn in 2013/2014 and final increase slightly to R26.7billion in 2014/2015 financial year. The expenditure in administration and other health services and central hospital services followed, taking third and fourth places, respectively. From 2010/2011 to 2012/2013 the HIV/AIDS and TB expenditure was the lowest, but from 2013/2014 to 2014/2015 health infrastructure became the lowest. The overall total health expenditure continually increased from R104.6bn to R145.7bn for the observed period. Currently, the size of health programmes is expected to expand with regards to the proposed National Health Insurance (NHI), and that would require a lot of funding to make it possible for every South African citizen to have access to the best and most affordable health service.

Figure 4.3 is used to explain health expenditure growth rates and its response to several policies adopted by the government since 1994.

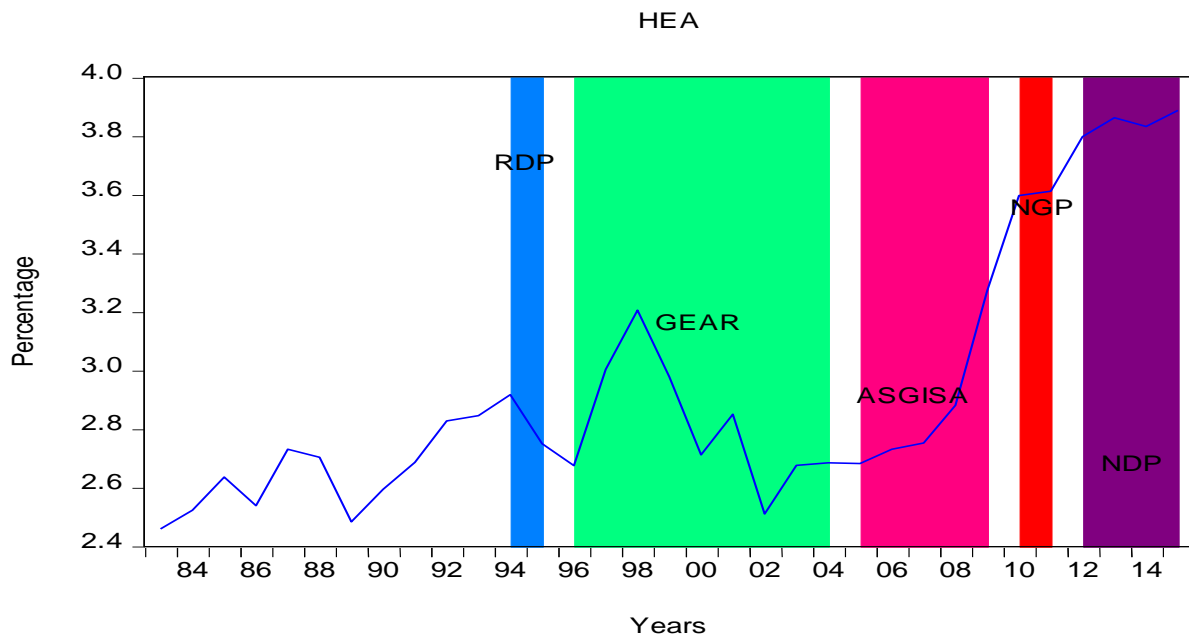


Figure 4.3: Public Health Expenditure as a Percentage of GDP

Source: Generated in EViews 10, using SARB (2016) data

Under the apartheid system (in the 1980s) health spending (HEA/GDP) depicted mixed trends, upward trends and downward trends; these variations occur between 2.46 to 2.75%. Within the RDP framework, the ratio of health expenditure to GDP was downwards trending from 2.92% to 2.74% (1994–1995). Under the GEAR strategy, the ratio of health expenditure to GDP reported an increase from 2.67 to 3.20% (1996–1998), a decrease from 2.98 to 2.71% (1999–2000), and an increase from 2.85% to 2.68% (2001–2004). Under ASGISA, the health expenditure as a percentage of GDP increased from 2.68% to 3.27% (2005–2009). With the NGP framework, the trend was still the same from 3.60% to 3.61% (2010–2011). The NDP structure had a similar impact on the ratio of health expenditure to GDP as the two previous policies (ASGISA and NGP), wherein the increase was from 3.80% to 3.89%. Figure 4.3 suggests that democracy is positively related to health expenditure (HEA/GDP) in the long run. The growth of health expenditure, in the long run, is also influenced by the HIV and AIDS epidemic. Therefore, public health spending plays an important role in promoting wellbeing, and economic growth through its impact on human capital.

4.7 TRANSFORMATION OF GOVERNMENT SOCIAL SPENDING ON SOCIAL PROTECTION

According to the United Nations Research Institute, social protection introduces strategies to prevent and manage the unfavourable circumstances that adversely impact the welfare of society. Social protection programmes have three pillars: labour market intervention, social insurance and social assistance. However, in South Africa, social protection presents as social assistance and is referred to as social grants (Triegaardt, 2005). Due to the apartheid system and the socio-challenges, the democratic government had to modify the social assistance programmes. The government introduced a new type of social assistance known as the child support grant which was introduced in 1998. This grant was targeted at vulnerable children, and the support would be accessible until they turned 18 years. The old-age grant was adjusted to reduce the pension age for men from 65 to 60 years, which was equivalent to the women's pension grant. There were also amendments to the war veterans' grant, care dependency grant, disability grant and foster care grant. Therefore, the number of people who receive social grants is very high in South Africa. Table 4.3 depicts the summary of social grants offered by the government in different regions.

Table 4.3: The Summary of the Number of Social Grants by Region on 31 December 2017

Region	Grant type							Total
	OAG	WVG	DG	GIA	CDG	FCG	CSG	
EC	556,105	23	180,412	21,688	22,478	84,500	1,887,079	2,752,285
FS	197,645	1	75,711	5,569	8,114	26,669	682,402	996,111
GP	574,444	48	117,840	6,303	19,163	45,263	1,818,075	2,581,136
KZN	673,793	18	229,458	54,098	39,123	79,397	2,782,071	3,857,958
LP	457,753	3	96,167	42,622	15,316	38,639	1,801,028	2,451,528
MP	246,755	4	78,475	14,754	11,310	26,611	1,079,685	1,457,594
NC	85,677	3	52,149	10,521	6,015	11,409	307,026	472,800
NW	253,705	2	75,568	10,801	10,068	29,100	839,462	1,218,706
WC	335,027	43	159,756	18,340	15,079	30,055	1,000,845	1,559,145
Total	3,380,904	145	1,065,536	184,696	146,666	371,643	12,197,673	17,347,263

Source: SOCPEN system

NB: The total include grant in aid

The social grants in South Africa can be differentiated into Old Age Grant (OAG), War Veteran's Grant (WVG), Disability Grant (DS), and Grant in Aid (GIA), Care

Dependency Grant (CDG), Foster Child Grant (FCG) and Child Support Grant (CSG). The number of social grants statistics is represented in each province which are: Eastern Cape (EC), Free State (FS), Gauteng (GP), and KwaZulu-Natal (KZN), Limpopo (LP), Mpumalanga (MP), Northern Cape (NC), North West (NW) and Western Cape (WC).

The results indicate that the CSG is the highest among the other social grants having 12 197 673 recipients. This is followed by OAG and disability grant DG, at 3 380 904 and 1 065 536 recipients, respectively. The WVG is the lowest compared to other grants. KwaZulu-Natal (KZN) has the highest recipients' rate compared to other provinces, while Northern Cape (NC) has the lowest number of people depending on social grants. In summary, there are 17 347 263 South Africans depending on a social grant for survival, as of 31 December 2017.

Table 4.3 shows that many households live below the poverty line and require government intervention. Thus, government social protection plays an important role in the transformation of households' wellbeing in South Africa. The growth of government social protection spending is illustrated in Figure 4.4, spanning from 1983 to 2015.

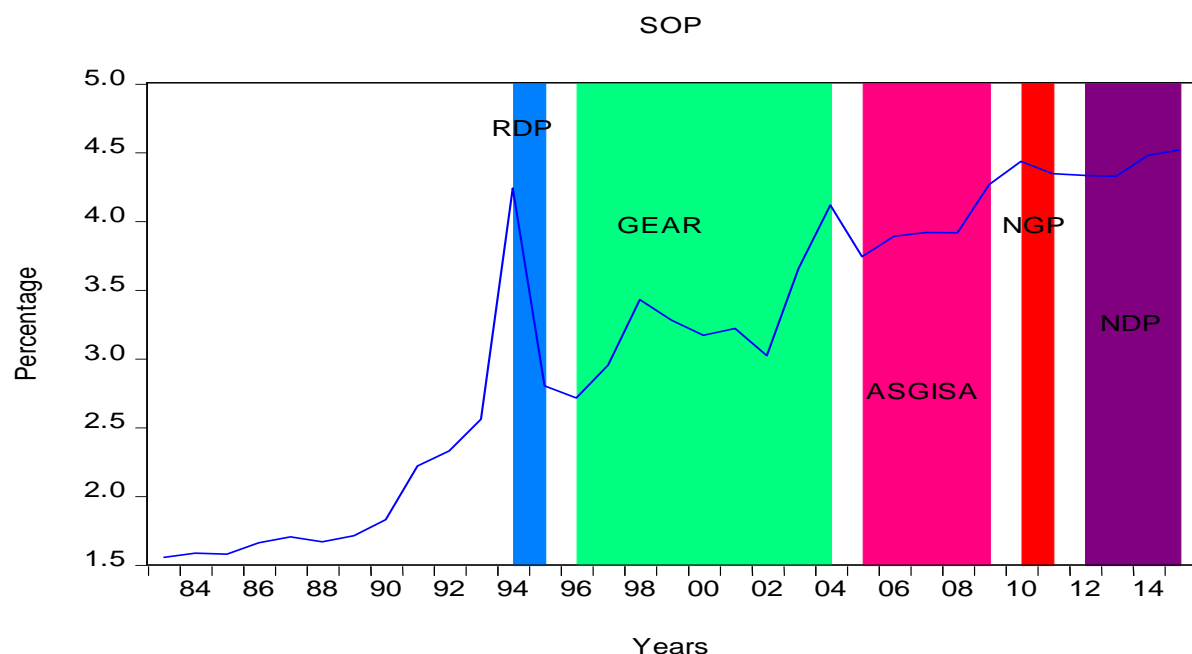


Figure 4.4: Social Protection Expenditure as a Percentage of GDP

Source: Generated in EViews 10, using SARB (2016) data

During the 1980s, the social protection expenditure (SOP/GDP) was very low, oscillating between 1.55% and 1.71%. In the early 1990s, it started increasing from 1.83% to 4.24%. The ratio of social protection expenditure to GDP depicts a downwards trend from 4.24% to 2.80% (1994–1995) under the RDP framework. The adoption of GEAR caused social protection spending (SOP/GDP) to fluctuate between 2.71% and 4.11% (1996–2004). The graph suggests an upward trend from 3.74% to 4.26% (2005–2009) within the structure of ASGISA. The ratio of social protection spending to GDP decreased from 4.43% to 4.34% (2010–2011) as the NGP was executed, but increased under the NDP approach from 4.33% to 4.51%. Social protection expenditure has been increasing over time. Therefore, implemented policies have favoured the expansion of social protection expenditure, especially from GEAR to NDP. Unless inequality and poverty decline, social protection and expenditure will continue to rise. The social protection programmes have a positive influence on the daily consumption for poor households.

4.8 ECONOMIC GROWTH IN SOUTH AFRICA

According to statistics, the rise in government spending has been unsuccessful in generating sustainable economic growth, thus, challenging theoretical understanding, which postulates that fiscal policy acts as a stabilizing factor during fluctuations in the economy. The following diagram graphically displays the fluctuation of GDP growth between 1983 and 2015 (World Bank, 2017).

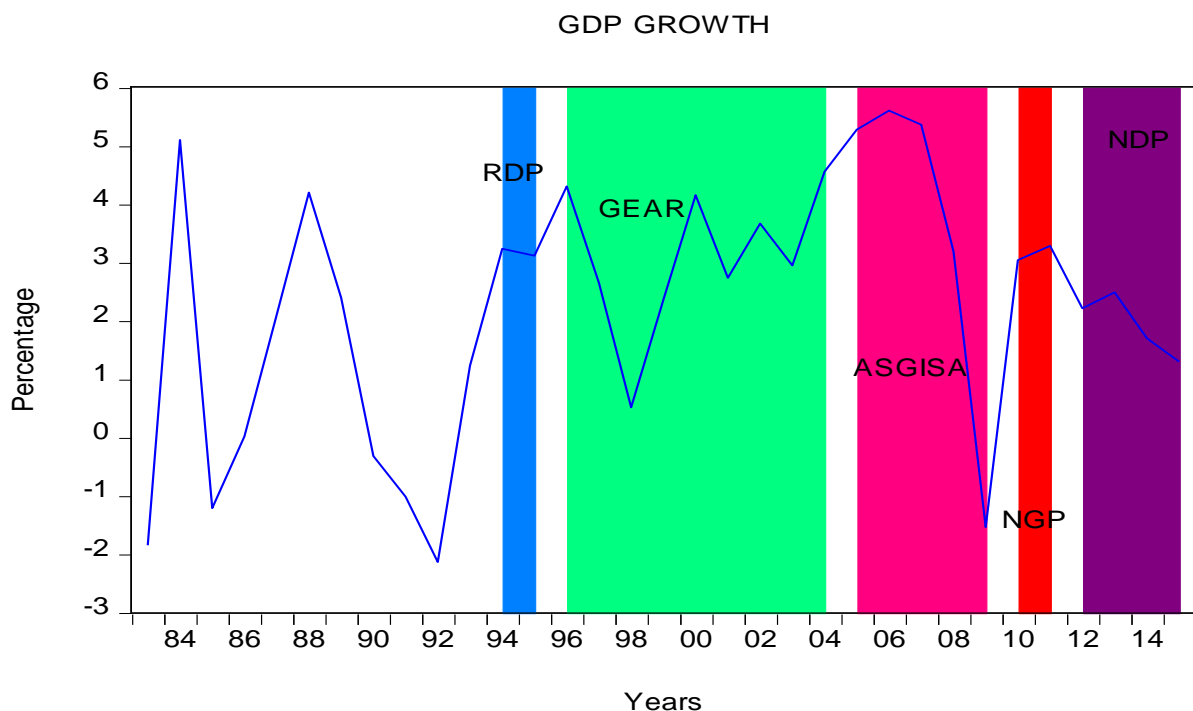


Figure 4.5: Economic Growth

Source: Generated in EViews 10, using SARB (2016) data

The highest growth reached under the apartheid era was 5.1% (1984) and 4.2% (1988) and the lowest points were -1.2% (1985) and -2.1% (1992). The duration of the RDP approach the GDP growth runs from 3.23% to 3.12%. Within the structures of GEAR, the GDP growth oscillated between 4.3% and 4.55% (1996–2004). When ASGISA was adopted, the GDP growth reached two notable points, first being the highest growth of 5.60% (2006), and secondly, the lowest point of -1.5% (2009). When the NGP framework was executed, the GDP growth increased from 3.04% (2010) to 3.28% (2011), but under the NDP, it moved upwards from 2.21% (2012) to 2.50% (2013) and downwards to 1.3% (2015). The fall of economic growth in 2009 was a result of the global financial crisis of 2008, which drove many economies in the recession. South African GDP grows at a low rate, which currently makes it impossible to achieve the growth required to create 11 million jobs by 2030. Therefore, NDP has to generate higher and more sustainable economic growth and invest more in human capital, in order for the 2030 goals to be achieved.

4.9 CONCLUSION

The apartheid system, socio-economic challenges and all the policies that were implemented by the democratic government have had a major contribution to the transformation of government social spending. The introduction of the child support grant, free education, the rehabilitation of human settlements and widespread communicable such as HIV/AIDs, STDs and poverty linked diseases have also caused the expansion of social programmes. The South African government has devoted a lot of resources to social development programmes, in an attempt to stimulate the welfare of society and economic growth.

It is important to empirically examine the impact that government social spending has on economic growth and the wellbeing of the people. The question is whether government social spending stimulates growth or has an equalizing effect on income distribution or increases the consumption expenditure for the poor households. The current study empirically investigates the impact of disaggregate government social spending on economic wellbeing.

CHAPTER FIVE

METHODOLOGY AND MODEL SPECIFICATION

5.1 INTRODUCTION

This chapter discusses the applicable statistical estimation concepts and econometric modelling techniques employed by the study in order to empirically quantify the effect of government social spending on economic wellbeing in South Africa. To conduct all the estimations EViews 10 software was used. This last section presents specification of growth, Gini and consumption models.

Section 5.1 presents a time series framework and discusses the stationary properties and unit root tests employed to determine whether the variables used are stationary or non-stationary. Section 5.2 reviews the ARDL modelling approach. The theoretical framework for diagnostic tests, such as serial correlation, normality, heteroscedasticity, mis-specification and stability is presented in section 5.3. Furthermore, section 5.4 is the second part of this chapter which deals with the model specification for growth, Gini and consumption models. Section 5.5 deals with the data source and description of variables employed. Section 5.6 presents the justification of variables, from the dependent variables to explanatory variables. The relevant transformation undergone by the variables is explained in section 5.7, while section 5.8 presents a summary of chapter five.

5.2 TIME SERIES MODELLING

Time series data generates observations with different values and for the different time periods, contrary to a cross-sectional method which collects its data at a specific point in time (Koop, 2013). Therefore, time series data has the following fundamental characteristics:

- A normal time series is considered to have a clear trend.
- When a shock arises, time series demonstrates high levels of persistence, regardless of its magnitude.
- Normal time series data seem to wander.

- The volatility of most series tends to fluctuate, hence is not constant over time.
- Co-movement among most series is found over time.

According to Gujarati and Porter (2009), these time series characteristics pose several threats to statistical analysis, such as serial correlation which may cause a spurious model to be estimated. Consequently, to avoid a false model, it is important to examine the statistical properties of time series data employed in the study.

5.2.1 Stationarity Test

The stationary series shows constant mean, variance and covariance in the long run. The series with the unit root generates a spurious regression, which violates the OLS assumption as the variance becomes infinity, and also incorporates high R^2 , which may also indicate the high level of autocorrelation (Asterious and Hall, 2011). Theoretically, the errors become permanent as the autocorrelation do not decay. The non-stationary regression incorporates coefficients values (F-statistics, p-values and t-statistics) that appear to be statistically significant. However, the statistical analysis from the non-stationary model are misleading and unreliable without any economic meaning. Therefore, it is extremely important to evaluate the nature of the time series, whether is stationary or not (Gujarati and Porter, 2009).

There is significance in performing stationarity tests for the employed time-series. In literature, testing for stationarity can be formal or informal. Therefore, the current study performed formal tests only, which were Dickey-Fuller, Augmented Dickey-Fuller tests (Dickey & Fuller, 1981) and the Phillips Peron test (Phillips and Perron, 1988).

5.2.1.1 Augmented Dickey-Fuller Test

The Augmented Dickey-Fuller (ADF) test is transformed from the Dickey-Fuller (DF) methodology which was developed in 1981. Unlike the DF approach, the Augmented Dickey-Fuller (ADF) technique enables researchers to test whether the error terms of the series are autocorrelated or not.

$$\Delta Y_t = \theta Y_{t-1} + \sum_{i=1}^p \beta_i \Delta Y_{t-1} + \mu_t \quad (5.1)$$

$$\Delta Y_t = \lambda_0 + \theta Y_{t-1} + \sum_{i=1}^p \beta_i \Delta Y_{t-1} + \mu_t \quad (5.2)$$

$$\Delta Y_t = \lambda_0 + \theta Y_{t-1} + \lambda_1 t + \sum_{i=1}^p \beta_i \Delta Y_{t-i} + \mu_t \quad (5.3)$$

The above equations represent three models that can be tested under the ADF technique, which can also be referred to as the tau-tests. Equations 5.1, 5.2 and 5.3 depict the ADF test for none, intercept (constant), and constant and trend of the deterministic components, respectively. The μ_t from the three equations represents the pure white noise error. The difference among the three models is the presence of the deterministic elements λ_0 and λ_1 . Therefore, the null hypothesis for the three ADF tests is the time series data are non-stationary while the alternative hypothesis suggest that the series has no unit root. Normally, the time series data are not stationary at level form, which cause the null hypothesis to be accepted and leads the variables to be differenced once, and therefore reject the null hypothesis since at first difference there is no unit root.

5.2.1.2 Phillips and Perron (PP) Test

Since stationarity is essential in econometric modelling, the study will also adopt the Phillips–Perron (PP) approach, which is another formal unit root test. This enables the researcher to report accurate and robust results of stationarity. The PP test is considered to be the generalized version of the Dickey-Fuller technique since it is less restrictive on the nature of the error terms. It has no predictions about the error terms default, the assumption that error terms should be homogeneity or serially uncorrelated since it provides a heteroscedastic and autocorrelation consistency correction to the Dickey-Fuller test statistic. However, some similarity exists between the two procedures, since PP tests are also conducted with the three models depicted in the ADF explanation, hence the null hypothesis states that the series is non-stationary, while the alternative hypothesis indicates the variable is stationary. Consequently, the study will utilize both the unit root test, the ADF approach and the PP technique. Notably, the adopted approaches have some shortcomings. For instance, both tests are sensitive to structural breaks, however, the ADF test is the weaker one when compared to the PP test. The criticism suggests that the PP approach is only suitable for a large sample.

According to Wooldridge (2013), the results' stationary tests will help to draw the conclusion of whether the time series is a weakly dependent process, which implies

that the series in levels is stationary and integrated of order zero $I(0)$ and no transformation is required, or the time series has a random walk (with or without drift), and need to be transformed in order to be rendered stationary. The transformation approach that is adopted depends on the nature of the trend that is present in the series. Therefore, if time series with unit root incorporate stochastic trend, then the suitable transformation procedure to render the series stationary would be to introduce the first difference approach, also referred to as difference stationary process. When the non-stationary series displays deterministic trends, the relevant method would be to detrend the non-stationary time series, by regressing it on time. This is also known as a trend stationary process. Nelson and Plosser (1982) proposed that stochastic trends are normally presented in most of the economic time series, rather than deterministic trends.

5.3 THE ARDL BOUND APPROACH FOR COINTEGRATION ANALYSIS

After determining the order of integration for the time series, the study proceeds to evaluate the cointegration relationship between the employed variables. Therefore, the study uses the ARDL bound test. Cointegration analysis is essential as it determines whether there is a long run equilibrium association between an endogenous variable and the explanatory variables. Cointegration techniques, such as those of Engle and Granger (1987) and Johansen and Juselius (1990), are applicable to series that are integrated of the same order, normally integrated of order one. However, the ARDL bound cointegration test can be employed whether the variables are $I(1)$, $I(0)$ or integrated of mixed order one and zero. Since the time series data are integrated of mixed order $I(1)$ and $I(0)$, the study employs ARDL as an econometric modelling approach to estimate the long run and short run dynamics for the growth, Gini and consumption models. For optimal lag selection, the study relies on ARDL-AIC (Akaike Information Criteria) as it generates robust results for the model with small observations.

5.3.1 Auto-Regressive Distributed Lag (ARDL) Approach

Autoregressive Distributed Lag (ARDL) modelling is the recently developed single equation regression, which is also known as the bound testing approach (Persaran *et al.*, 2001). This approach is suitable for series with a small size sample, and it becomes possible to utilize it when variables are integrated of order one and order zero. The

simple ARDL model can be denoted as $ARDL(p, q_1, \dots, q_k)$. The number of lags for endogenous variables is presented by p and the remaining lags are of explanatory variables. Hence a basic ARDL model can be expressed as:

$$Y_t = a + \sum_{i=1}^p \phi Y_{t-i} + \sum_{j=0}^k \sum_{i=0}^{q_j} X_{j,t-i} \beta_{j,i} + \varepsilon_t \quad (5.4)$$

Where Y_t is the dependent variable, a is constant variable, (X_t) is explanatory variable which can be purely $I(0)$ and $I(1)$ or cointegrated, β and ϕ are coefficients, k, p, q are the optimal lag orders and ε_t represents the vector of error term. Thus, the above ARDL model states that an endogenous variable is a function of its own lagged values, current and lagged values of other explanatory variables in the model. When estimating an ARDL model, the lag length of the endogenous variable (p) and of regressors (q) may not necessarily be the same. There are two types of regressors. The first one is known as static or fixed regressors, where these variables do not embed any lags ($q_j = 0$). The second are called dynamic regressors and these variables have at least one lag. Also, to obtain valid statistical inference, the appropriate choice of lag order is crucial for a robust ARDL model. According to Pesaran *et al.* (2001), the Schwarz Bayesian criteria (SBC) and Akaike information criteria (AIC) generate robust results for models of a small sample size.

Through the ARDL modelling, a dynamic unique relationship is observed between the endogenous variable and the exogenous variables, and consequently, it becomes possible to transform the model into a long run presentation separated from the short run dynamic behaviour, to denote how dependent variable responds to shock in independent variables in the long run. Therefore, the long run coefficient is computed as given below:

$$\theta_j = \frac{\sum_{i=1}^{q_j} \beta_{j,i}}{\sum_{i=1}^p \phi_i} \quad (5.5)$$

5.3.2 Bound Testing Approach for Cointegrating Relationships

According to Pesaran *et al.* (2001), the ARDL approach can estimate the long run relationship without rigorous inspection of the integration properties of regressors, since having the unique ability to embed variables of $I(0)$ and $I(1)$. However, even with this rare attribute, that the ARDL model possesses the data used to estimate, this

model must be tested for unit root, in order to avoid employing variables which are I(2) or higher order, which is prohibited in the ARDL modelling. Hence, the unit root tests are conducted to ensure that the series are integrated of the appropriate order, with regards to ARDL procedure, and in terms of the preliminary analysis in economic research. According to this approach, the lagged endogenous and exogenous variable is flexible to incorporate different lag length, and consequently, it is not necessary for the employed lag length to be symmetrical.

Hence, the cointegrating equation of basic ARDL model in 5.4 is developed into unrestricted error correction model as follows:

$$\Delta Y_t = - \sum_{i=1}^{p-1} \phi_i * \Delta Y_{t-1} + \sum_{j=1}^k \sum_{i=0}^{q_j-1} \Delta X_{j,t-i} \beta_{j,i} * \wedge - \delta EC_{t-1} + \mu_t \quad (5.6)$$

From equation 5.6, the vector of short run coefficient estimates of the first-differenced regressors in their current state, as well in their lagged form, is represented by β . While δ is the speed of adjustment which incorporates a negative sign and indicates how the system adjusts to long run equilibrium after past period deviation. Therefore, it is given by $\delta = 1 - \sum_{i=1}^{p-1} \phi_i$, while the error correction term is expressed as $EC_t = y_t - a - \sum_{j,i} X_{j,i} \vartheta$. The vector $\phi_i^* = \sum_{m=i+1}^p \phi_m$ and vector $\beta_{j,i}^* = \sum_{m=i}^{q_j} \beta_{j,m}$.

According to Persaran *et al.* (2001), bound testing modelling is constructed by transforming equation 5.6. Therefore, the specified equation 5.7 below is known as a typical ARDL-ECM model, which is utilised to test the long run relationship between an endogenous variable and the exogenous variables.

$$\Delta Y_t = - \sum_{i=1}^{p-1} \phi_i * \Delta Y_{t-1} + \sum_{j=1}^k \sum_{i=0}^{q_j-1} \Delta X_{j,t-i} \beta_{j,i} * - \lambda Y_{t-1} - a - \sum_{j=1}^k X_{j,t-1} \lambda_j + u_t \quad (5.7)$$

The parameters employed to perform the bound tests can be generated using equation 5.7, or directly from equation 5.4. The white noise u_t is identical and independently distributed, and meets all the classical assumptions requirements. The bound F-test is a test of joint significance between the long run level parameters in the first lags in equation 5.7. Therefore, the null hypothesis of both equations test is $H_0 : \lambda_1 = \lambda_2 = \lambda_j = 0$, meaning that there is no long run relationship between the endogenous variable and the regressors. The rejection of the null hypothesis indicates the existence of a long run relationship among the dependent variable and the

independent variables. Hence, this leads to the acceptance of the alternative hypothesis, which is $H_1 : \lambda_1 \neq \lambda_2 \neq \lambda_j \neq 0$.

This technique provides two sets of asymptotic critical values, one set suggesting that all the employed regressors in the ARDL bound approach are integrated of order one $I(1)$, while the other set on critical values implies that the regressors are integrated at order zero $I(0)$. Hence, if the computed F–statistic is below the lower critical bound, then the null hypothesis is accepted, implying that the dependent variable and independent variables are not linked in the long run. However, when the computed F–statistic is above the upper bound, then the null hypothesis is rejected, indicating the existence of a long run relationship between an endogenous variable and its explanatory variables.

5.4 DIAGNOSTIC INSPECTION

After estimating the ARDL growth, Gini and consumption models, the standard procedure is to proceed and conduct diagnostic tests for serial correlation, heteroscedasticity, normality and misspecification. A good regression model should have no serial correlation, be homoscedasticity and its residuals must be normally distributed, as proposed by the classical assumption for ordinary least square (OLS). The study also checks the stability of the three models. Consequently, the relevant techniques employed to check the diagnostic issues within the model are discussed.

5.4.1 Serial Correlation Test

The one important classical assumption of OLS suggests that covariances and correlations between the different disturbances are all zero:

$$\text{Cov}(\mu_t, \mu_s) = 0 \text{ for all } t \neq s \quad (5.8)$$

The assumption implies that disturbances μ_t , and μ_s for regression model are independently distributed (Asterious and Hall, 2011). However, if this classical assumption is violated, then the error terms are no longer independent, but are pairwise serially correlated.

$$\text{Cov}(\mu_t, \mu_s) \neq 0 \text{ for all } t \neq s \quad (5.9)$$

This suggests that disturbances occurring at period t may be correlated with one at period s . As a result, a spurious model ends up being estimated, since serial correlation induces higher R^2 and gives significant values for t -statistics and F -statistics, which are not valid. The problem of serial correlations is likely to be encountered in a time series approach and especially for macroeconomic data, thus it is important to conduct the serial correlation test, since the study is based on time series data (Gujarati and Porter, 2009). The serial correlation can be detected through the Durbin-Watson (DW) test or Breusch-Godfrey test. However, the DW test has various obstacles, for example, the technique provides inconclusive results, when the endogenous variable is lagged, and the DW test is not applicable and fails to consider higher orders of serial correlation. Therefore, the study employs the Breusch-Godfrey LM test since it is able to accommodate all the above cases.

Consider the following model:

$$Y_t = \beta_1 + \beta_2 X_{2t} + \beta_3 X_{3t} + \dots + \beta_k X_{kt} + \mu_t \quad (5.10)$$

Where:

$$\mu_t = \rho_1 \mu_{t-1} + \rho_2 \mu_{t-2} + \dots + \rho_p \mu_{t-p} + \varepsilon_t \quad (5.11)$$

The Breusch- Godfrey LM test combines equations 5.10 and 5.11 and it expresses:

$$Y_t = \beta_1 + \beta_2 X_{2t} + \beta_3 X_{3t} + \dots + \beta_k X_{kt} + \rho_1 \mu_{t-1} + \rho_2 \mu_{t-2} + \dots + \rho_p \mu_{t-p} + \varepsilon_t \quad (5.12)$$

And the hypotheses for this approach are as follows:

$$H_0: \rho_1 = \rho_2 \dots = \rho_p = 0 \text{ (No serial correlation)}$$

$$H_1: \text{at least one of the } \rho \text{ is not zero, thus serial correlation.}$$

5.4.2 Normality Test

Another key classical assumption stipulates that a good regression model error terms must be normally distributed with zero mean and a constant variance. However, if the assumption is violated, the residuals are not normally distributed, and the F -statistics and t -statistics of the model are rendered invalid. Consequently, to detect whether the disturbances are normally distributed, econometricians have recommended the use of Jarque-Bera. The normality evaluation is done by employing kurtosis and skewness

as measures of the distribution of errors. The null hypothesis for the test state that residuals are normally distributed. Therefore, the null hypothesis is accepted if the corresponding p-value of the Jarque-Bera (JB) statistic is above 5% level of significance (Asterious and Hall, 2011).

5.4.3 Heteroscedasticity Test

One of the classical assumptions of linear regression model states that error terms should have constant variance independent of i , $var(\mu_t)=\sigma^2$, implying that the disturbance are homoskedastic. However, when the assumption is violated, the estimated model presents misleading results for F-statistics and t-statistics because of heteroskedasticity. Therefore, the study will employ the Breusch-Pagan test to check whether the estimated model has heteroskedasticity or its disturbances are homoscedasticity. This approach is recommended by many researchers and is well known for its robustness (Gujarati & Porter, 2009).

5.4.4 The Ramsey RESET Test

The Ramsey RESET test is used to evaluate whether there is mis-specification bias in the estimated model. The Ramsey framework proposed that mis-specification occurs neither by the exclusion of significant variables or inclusion of irrelevant variables (Gujarati and Porter, 2009). The null hypothesis of no mis-specification bias is accepted if the corresponding p-value of F-statistics is greater than a 5% level of significance.

5.4.5 Stability Test

Finally, to check the stability of the models through the recursive residuals, Brown *et al.* (1975) established the cumulative sum of recursive residuals (CUSUM) and the cumulative sum of squares of recursive residuals (CUSUMSQ), to determine the stability of the estimated model. Therefore, when there is a structural break in the regression, this technique allows the researcher to identify the exact period the change occurred. Generally, the CUSUM and CUSUMQ are conducted through graphical representation and are plotted at a 5% level of significance. The null hypothesis states the coefficient vector α is the same for all periods. Thus, the null hypothesis is rejected if the plots cross the critical lines at 5% level of significance, but if the plot of the CUSUM and CUSUMSQ statistics are within the critical bounds of 5% level of significance, the null hypothesis is accepted (Asterious and Hall, 2011).

5.5 MODEL SPECIFICATION

This section discusses the theoretical and empirical framework adopted in order to estimate the growth, Gini and consumption models. It also specifies the employed variables, from the GDP per capita to all the government social spending variables (education, health and social protection), Gini coefficient and household consumption, and gives a description of the employed data and the models respective source.

5.5.1 Theoretical Framework for a Growth Model

The Keynesian framework proposes that economic growth is a function of government spending. Jerono (2009) and Muthui *et al.* (2013) extended and postulated that economic growth is a function of all components of government spending.

$$GDP = f(GEXP) \quad (5.13)$$

$$GDP = f(\text{government spending for all components}) \quad (5.14)$$

However, the aim of this study is to investigate the relationship between government social spending and economic growth. The study adopts the Khan and Bashar (2015) growth model, where real GDP per capita is a function of government expenditure in education, health and social welfare, as depicted in the equation below:

$$GDP_{pc} = f(EDU, HEA, SOP) \quad (5.15)$$

Even though the central goal is to examine the impact of government social spending on economic growth, there are numerous variables that determine growth therefore, the study includes, real money supply and real effective exchange rate as control variables. Because of the small sample size, only two control variables could be incorporated into the model.

$$GDP_{pc_t} = f(EDU, HEA, SOP, MS, REER) \quad (5.16)$$

$$GDP_{pc_t} = \beta_0 + \beta_1 EDU_t + \beta_2 HEA_t + \beta_3 SOP_t + \beta_4 MS_t + \beta_5 REER_t + u_t \quad (5.17)$$

GDP_{pc} = real Gross Domestic Product per capita.

EDU = real government expenditure on education.

HEA = real government expenditure on health.

SOP = real government expenditure on social protection.

MS = real money supply.

REER = real effective exchange rate.

For the purpose of the current study, all government social spending variables (education, health and social protection) are converted to per capita values, which removes the effect of population growth. Finally, the variables are transformed expressed into natural logs form and estimated equations are written as follows:

$$LGDPpc_t = \beta_0 + \beta_1 LEDUpc_t + \beta_2 LHEApc_t + \beta_3 LSOPpc_t + \beta_4 LMS_t + \beta_5 LREER_t + u_t \quad (5.18)$$

Equation 5.18 depicts the estimated model, where L represents the natural logs and *pc* stands for per capita terms, where subscript t represents time, and β_0 is an intercept, u_t is the error term while $\beta_1, \beta_2, \beta_3, \beta_4$ and β_5 are the long run parameters. The growth model is based on time series secondary data spanning the period 1983–2016. This sampling period was selected to capture the era in which the South African economy was characterized by increased social spending in an effort to avert social inequalities that were created by the apartheid system. Given that the available data for social spending is only annual, the sampling period yields a total of 34 observations.

5.5.2 Theoretical Framework for Gini Model

To evaluate the relationship between government social spending and income inequality, the study adopted the methodological specification of Anderson *et al.* (2017), which presents income inequality as a function of government spending on education, health and social welfare, as a share of GDP and other independent variables. The model is expressed as follows:

$$I_{it} = \beta_0 + \beta_1 X_{it} + \beta_k Z_{itk} + u_{it} \quad (5.19)$$

I = income inequality.

X = government spending on (education, health and welfare).

Z = vector of other independent variables.

μ = error term.

Therefore, the Anderson *et al.* (2017) model is modified, and the income Gini coefficient is proxy for income inequality, and government spending on education, health, social protection is included as explanatory variables. For the other independent variables that Anderson *et al.* (2017) proposed, disposable income per capita and real interest rate (lending rate) are added. To capture the transition period, a dummy for democracy is included. The data are available for the Gini coefficient ending in 2015. Thus, the Gini model employs annual time series data spanning from 1983 to 2015, and is depicted as follows:

$$LGINI_t = \beta_0 + \beta_1 LEDUpc_t + \beta_2 LHEApc_t + \beta_3 LSOPpc_t + \beta_4 LDIPc_t + \beta_5 RIR_t + \beta_6 Dummy_t + u_t \quad (5.20)$$

Gini = Gini coefficient.

Dipc = disposable income per capita.

RIR = real interest rates, the lending rate.

The Dipc and RIR variables are macroeconomic variables that are employed as control variables for the studies. Notable real interest rate (lending rate) is not transformed into natural logs because it was presented in percentages.

5.5.3 Theoretical Framework for Consumption Model

To access the impact of government social spending on household consumption, the recent standard theoretical framework, which was proposed by Ganelli and Tervala (2009); Tervala (2009), and Linnemann and Schabert (2006), has been employed. Therefore, the utility function of the household is:

$$U = \log(C + G) \frac{1}{1+v} L^{1+v} + V(G) \quad (5.21)$$

Where C, G and L denote private consumption, government spending and the labour supplied, respectively. The government spending also has separate utility effect through V(G). The marginal disutility of work is measured by v, while the marginal utility of private consumption is given by:

$$\frac{\partial U}{\partial C} = \frac{1}{C + \alpha G} \quad (5.22)$$

The sign of the coefficient of the above equation relies upon the response of government spending to private consumption. The sign could be negative or positive depending upon the association between government spending and private consumption, while budget constraint of the household is:

$$PC = PwL - P_\tau + \int_0^1 D(i) di \quad (5.23)$$

Where P, w, τ, D respectively denote aggregate price level, real wage rate, lump sum tax and the dividends of firm . In the equation 5.23, only sum tax and government spending are fully financed by tax revenue. Therefore, the household optimization model is:

$$\lambda = \frac{1}{P(C + \alpha G)} \quad (5.24)$$

$$L^V = \lambda Pw \quad (5.25)$$

When substituting equation (5.24) into (5.25) and we get equation (5.26), which represents consumption leisure trade-off:

$$L^V = \frac{w}{(C + \alpha G)} \quad (5.26)$$

The production function of a firm is express as follows:

$$Y = L^\eta G^\gamma \quad (5.27)$$

The first order condition of profit maximization implies:

$$MC = w / (\eta L^{\eta-1} G^\gamma) \quad (5.28)$$

Where MC is marginal cost, in equation (5.28) the elasticity of government spending is positive, which shows that government spending increases private consumption. Therefore, the consumption model indicates that household consumption expenditure per capita (LCONSpC) is a function of government social spending variables (education, health and social protection) and control variables household disposable

income per capita (LDIpc), real interest rate (RIR). The consumption model includes 34 observations spanning from 1983 to 2016, and can be expressed as follows:

$$LCONSpc_t = \beta_0 + \beta_1 LEDUpc_t + \beta_2 LHEApc_t + \beta_3 LSOPpc_t + \beta_4 LDIpc_t + \beta_5 RIRpc_t + u_t$$

(5.29)

5.6 DATA SOURCE AND DESCRIPTION OF VARIABLES

Table 5.1 represents the descriptions, metric, and source for all the variables that have been utilized in the study. The data for GDP per capita, government social spending on education (LEDUpc), health (LHEApc) and social protection (LSOPpc), household consumption expenditure (LCONSpc), money supply (LMS), real effective exchange rate (LREER), household disposable income per (LDIpc) were extracted from South African Reserve Bank (SARB) online website. The consumer price index (CPI) and the real interest rate (RIR) variables were obtained from the World Bank and the Gini coefficient data from world income inequality database (WIID)

Table 5.1: Data Source and Description of Variables

Variables	Description	Metric (units of measurement)	Source
Real (GDP) Per capita	Gross Domestic Product (GDP) per capita. At constant 2010 Prices. Annual	Rand	SARB (2017) KBP6270Y
EDU	Total education expenditure: Consolidated general government. Annual	R millions	(SARB) KBP4373
HEA	Total health expenditure: Consolidated general government. Annual	R millions	(SARB) KBP4374
SOP	Total social protection expenditure: Consolidated general government. Annual	R millions	(SARB) KBP4375
GINI	Gini coefficient	Index	WIID
CONS	Final (consumption expenditure) by household: Total (PCE) Annual	R millions	(SARB) KBP 6007J
CPI	Consumer Price Index (100=2010)	Index	World Bank (WDI)
MS	Monetary aggregate: Money supply: M2 annual	R millions	(SARB) KBP 1373J
REER	Real effective exchange rate: Average for the period – 20 trading partners: Annual	Index	(SARB) KBP 5392
Dlpc	Disposable Income per capita of households. Annual	Rand	(SARB) KBP 6272Y
RIR	Real interest rate: Lending interest rate adjusted for inflation. Annual.	Percentage	World Bank (WDI)

5.7 JUSTIFICATIONS OF VARIABLES

This section describes and justifies the variables employed by the study, which are real GDP per capita, government social spending on education, health, social protection, Gini coefficient, household consumption spending and the chosen controlled variables. The selection of this variable is based on theoretical and empirical literature.

Economic growth measures the increase in the production rate of domestic firms, due to the growth of aggregate demand, the greater the initial stock of human capital that generates new commodities or knowledge that support technological development. The optimal goal for developing countries is to foster growth for their economies, and since South Africa is included in this cycle, it prioritises growth. Many studies have used **real GDP per capita** as a proxy for economic growth (Chude and Chude, 2013; Kamasa and Abebrese, 2015; Kanono and Sello, 2016; Khan and Bashar, 2015; Odhiambo, 2015) and their results suggest that GDP per capita is the best measure of economic growth. This study has employed real GDP per capita to represent economic growth since it supports empirical literature.

The government social spending on education health and social protection is employed in the study. The selection of variables was guided by theoretical and empirical literature. According to endogenous theories, public investment in **education** and **health** essentially stimulates economic growth, through its impact on human capital. Therefore, a nation with greater accumulation of human capital gains high returns, than a country with lower human capital. According to Asghar *et al.* (2011), a group of well-educated and healthy workers have greater opportunities for attaining better employment, increasing their salaries and boosting their standard of living. While empirical evidence from Khan and Basher (2015); Malick and Dash (2015); Mercan and Sezer (2014); Gurgul and Lach (2011), and Beraldo *et al.* (2009) concludes that government spending on education and health boosts economic growth. Furceri and Zdzienicka (2011) emphasized that social expenditure is significant for an economy that aims to achieve economic growth.

Social protection is the government expenditure that deals with society's wellbeing. Therefore, in South Africa's context, social protection presents social grants, which supports more than 11 million people. Most poor households depend on social grants

to provide for their daily needs. Social protection is a major component of government social spending which deals with the welfare of society (Van der Berg and Moses, 2012). To measure income inequality, we use the Gini coefficient as a proxy. Thus, the Gini coefficient is regularly presented in economic literature as the measure of income inequality. Empirical studies of authors such as Anderson *et al.* (2017); Jalil (2012); Azam and Raza (2018); Zhou and Li (2011); Spona (2010), and Wu and Hsu (2012) have employed income inequality as a proxy.

Household consumption expenditure is a variable that measures the final consumption expenditure by households in South Africa. Schclarek (2007), and Zheng and Zhang (2016) have used household consumption expenditure as a proxy for household consumption.

Control variables besides the government social spending variables, there are other variables that have that contribute to variation in economic growth (real GDP per capita), income inequality and household consumption expenditure. Therefore, they are known as control variables and may be selected based on a theoretical or empirical recommendation. Thus, it is important for every estimated model to incorporate control variables. The three estimated models, growth, Gini and consumption, have been included as control variables. The small sample size restricts the study to only two control variables for each model. Consequently, the growth model incorporates money supply and real effective exchange rate, while Gini and consumption models add disposable income per capita and real interest rate as control variables.

Macroeconomists emphasise the significance of sound monetary policy in a growth-driven nation. The central banks may employ expansionary or contractionary monetary policy to stabilize the economy during the business cycle fluctuation. Therefore, to capture the effect of monetary policy on economic growth, the money supply is used as a control variable in the growth model. According to the theory, when the central bank increases the money circulation in the economy the interest rate declines. Therefore, the firms expand their investment and capital stock, which stimulates both aggregate production and demand. Thus, expansion monetary policy improves economic growth. Empirical studies, such as those by Dingela and Khobai (2017) and Chaitip *et al.* (2015), presents evidence that indicates that money supply boosts economic growth.

According to South African policies, such as GEAR, ASGISA, NGP and NDP, trade is an essential element that is required for inclusive growth. The exchange rate has an important impact on trade. The growth model includes real effective exchange rate or exchange rate as a control variable. The exchange rate determines economic growth through its effect on trade. According to the Mundel-Flemming model, the appreciation of the exchange rate induces the price of exports to rise. Foreign countries find domestic goods more expensive and exports decline as a result. Citizens also find domestic goods to be expensive and they switch and buy more foreign goods. Therefore, the appreciation of the exchange rate causes exports to decline and imports to increase, and this trade deficit leads to low economic growth (GDP) in the long run. The depreciation of the exchange rate causes exports to increase and imports to decline. Consequently, the depreciation of the exchange rate boosts economic growth.

The Gini and consumption models use disposable income per capita as a control variable. According to Keynes' consumption theory, household current consumption is determined by disposable income. When disposable income increases, household consumption also increases. Households' lifestyle is determined by disposable income. Development theory also assumes that when income per capita improves, the move from a rural area to an urban area, meaning higher income per capita improves people standard of living. Therefore, the increase in disposable income improves the standard of living and promotes equality within society. The empirical literature generated by Chen *et al.* (2010) indicates that disposable income stimulates household consumption and standard of living.

The real interest rate is the second control variable included in the Gini and consumption model. The macroeconomic variables, such as the real interest rate, have a significant impact on households' behaviour and the economy. According to the theory, a monetary contraction through an increase in real interest rate decreases economic growth. This is because commercial banks increase the lending rate and as a result firms' investment and aggregate demand declines. According to the Life-Cycle Hypothesis (consumption theory), there is an inverse relationship between household current consumption and the interest rate. When interest rates rise, household consumption reduces.

5.8 RELEVANT DATA TRANSFORMATION

This subsection presents the applicable data transformation that is employed in the study, from nominal to real values and converts to per capita variables. The final stage is to transform the variables into natural logarithms.

5.8.1 Education Expenditure per capita (LEDUp_c)

Education data are obtained from the reserve bank online database and are deflated by the consumer price index (CPI = 2010), and converted to real education expenditure to per capita value, using population.

5.8.2 Health Expenditure per capita (LHEA_{pc})

Total health expenditure data are also extracted from the reserve bank database and deflated by the consumer price index (CPI = 2010) and transformed to per capita value.

5.8.3 Social Protection Expenditure per capita (LSOP_{pc})

Government social protection spending variable is also obtained from the reserve bank in normal values and are deflated by the consumer price index (CPI = 2010) and convert to per capita value.

5.8. 4 Household Consumption Expenditure per capita (LCONSP_{pc})

Household consumption spending variables are converted to real values through the consumer price index (CPI=2010) and transformed to per capita value.

5.8.5 Money Supply (LMS)

Money Supply is deflated by the consumer price index (CPI=2010) and becomes real money supply.

The real GDP per capita (LGDP_{pc}), real effective exchange rate (LREER) and disposable income per capita (LDI_{pc}) are only transformed into natural logarithms.

5.8.6 Natural Log Transformation

The employed variables were converted to a suitable form and then transformed into natural logarithms using E-views 10. This transformation was necessary to firstly ensure the results would be interpreted as elasticities, and secondly to minimize the effects of outlying observations and thirdly to neutralize the variance so that the possibility of heteroscedasticity would be kept minimal.

5.9 CONCLUSION

This chapter has provided a comprehensive discussion of all the statistical techniques and econometric modelling adopted in order to estimate the relationship between government social spending and economic wellbeing in South Africa from 1983 to 2016. The first section discussed the time series framework and econometric modelling approach. The second section described the model specification, model estimation, data source and description of variables, justification of variable and the transformation of variables.

CHAPTER SIX

EMPIRICAL ANALYSIS AND INTERPRETATION OF RESULTS

6.1 INTRODUCTION

This chapter outlines the statistical and econometric approaches employed to analyze the data, following the time series methods presented in chapter five. The empirical analysis is applicable to obtain the research objectives and to assess the research hypotheses presented in chapter one. Therefore, the ARDL modelling is employed to assess the association between disaggregated social spending and economic growth in South Africa.

Section 6.1 presents the preliminary assessment of the time series data employed, which outlines the descriptive statistics in order to understand the properties of the government social spending in education, health, social protection, real GDP per capita, Gini coefficient, household consumption expenditure, money supply, real effective exchange rate, disposable income per capita and real interest rate. Section 6.2 outlines the stationary estimation through which the order of integration is determined. Consequently, the unit root tests ADF and PP are employed.

The ARDL estimation results for the growth model is presented in section 6.3, starting with the cointegration test, followed by the long run, short run estimates result and the diagnostic results. The same procedure implies for Gini and consumption models presented in section 6.4 and 6.5, respectively. Section 6.6 concludes the chapter.

6.2 DESCRIPTION OF DATA

Before performing any empirical analysis, it important to carry out a preliminary assessment of the data series being employed. Thus, tables 6.1, 6.2, and 6.3 represent the summary of descriptive statistics for growth, Gini and consumption models, respectively.

Table 6.1: Descriptive Statistics for Growth Model

	LGDPpc	LEDUpC	LHEAPC	LSOPPC	LMS	LREER
Mean	4.683549	-4.635995	-4.919121	-4.913762	3.955033	1.977070
Median	4.672776	-4.659534	-4.978869	-4.914646	3.926999	1.981794
Maximum	4.752425	-4.430947	-4.650996	-4.581409	4.274107	2.136023
Minimum	4.627222	-4.812092	-5.075756	-5.271117	3.614736	1.860338
Std. Dev.	0.041555	0.122809	0.148099	0.247417	0.232933	0.056591
Skewness	0.456052	0.365768	0.745980	-0.122877	0.087668	0.303352
Kurtosis	1.770235	1.980995	2.024411	1.558680	1.456584	3.539710
Jarque-Bera	3.321029	2.229150	4.501769	3.028546	3.418239	0.934115
Probability	0.190041	0.328055	0.105306	0.219968	0.181025	0.626844
Sum	159.2407	-157.6238	-167.2501	-167.0679	134.4711	67.22039
Sum Sq. Dev.	0.056986	0.497709	0.723800	2.020104	1.790510	0.105685
Observations	34	34	34	34	34	34

Descriptive statistics are essential since they depict the symmetrical distribution of Real GDP per capita, government social spending on education (LEDUpC), health (LHEAPC), social protection (LSOPpc), money supply (LMS) and real effective exchange rate (LREER). According to the above table, the variables are normally distributed, since the mean and median values are almost identical for each variable and the skewness values are close to zero. The data for LGDPpc, LEDUpC, LHEAPC, LMS and LREER are positively skewed since their distribution is larger right-tailed compared to left-tailed. The distribution for LSOPpc is negatively skewed because the data is longer left tailed relative to the right.

The results for minimum and maximum measurements indicate slight variation in the variables, implying that the series is stable over the study period. Real GDP per capita, government social spending on education, health, social protection, real money supply follows a platykurtic distribution since the kurtosis values are below 3. However, real

effective exchange rate follows a leptokurtic distribution since its kurtosis values are greater than three. Therefore, a more reliable and formal technique used to test for normality in time series, is the Jarque–Bera test. This method proposes that normally distributed series must incorporate skewness and kurtosis coefficients of 0 and 3, respectively. Consequently, in the context of the study, the Jarque–Bere statistics values and corresponding p-values (probability) for the series indicate that all variable employed are normally distributed.

Table 6.2: Descriptive Statistics for Gini Model

	LGINI	LEDUPC	LHEAPC	LSOPPC	LDIPC	RIR
Mean	1.756334	-4.642159	-4.927246	-4.923834	0.868700	4.671668
Median	1.752816	-4.661117	-4.982310	-4.923383	0.869533	4.029848
Maximum	1.769377	-4.430947	-4.659756	-4.592857	0.878201	13.01244
Minimum	1.747412	-4.812092	-5.075756	-5.271117	0.857124	-2.406257
Std. Dev.	0.007988	0.119253	0.142492	0.244073	0.006346	3.509930
Skewness	0.370299	0.412276	0.826595	-0.086400	-0.276083	0.437416
Kurtosis	1.447574	2.097054	2.205709	1.563043	1.879990	3.197434
Jarque-Bera	4.067953	2.055894	4.625408	2.880219	2.144052	1.105930
Probability	0.130814	0.357741	0.098993	0.236902	0.342314	0.575242
Sum	57.95903	-153.1913	-162.5991	-162.4865	28.66708	154.1650
Sum Sq. Dev.	0.002042	0.455079	0.649730	1.906298	0.001289	394.2275
Observations	33	33	33	33	33	33

Table 6.2 depicts the symmetrical distribution of Gini coefficient (LGINI), government social spending on education (LEDUpC), health (LHEApC), social protection (LSOPpC), household disposable income per capita (LDIpc) and real interest rate (RIR). To understand the distribution of the series employed, various statistical measurements are evaluated. Consequently, the mean and median values are almost the same as the skewness values close to zero. The data of LGINI, LEDUpC, LHEApC, and RIR are

positively skewed since their distribution is larger right-tailed compared to left-tailed. The distribution for LRSOPpc and LDlpc is negatively skewed because the data is longer left tailed relative to the right. The minimum and maximum measurements indicate slight variation in the variables, implying that the series is stable for the study period.

Gini coefficient, government social spending on education, health, social protection, household disposable income per capita are platykurtic related to its normal distribution, since the kurtosis values are below three. However, real interest rate is leptokurtic related to its normal distribution since its kurtosis values are greater than three. According to the Jarque-Bera statistics, values and corresponding p-values (probability), all variable employed are normally distributed.

Table 6.3: Descriptive Statistics for Consumption Model

	LCONSPC	LEDUPC	LHEAPC	LSOPPC	LDIPC	RIR
Mean	-3.604112	-4.635995	-4.919121	-4.913762	4.434239	4.635758
Median	-3.635477	-4.659534	-4.978869	-4.914646	4.404848	4.020150
Maximum	-3.464925	-4.430947	-4.650996	-4.581409	4.528827	13.01244
Minimum	-3.725163	-4.812092	-5.075756	-5.271117	4.373519	-2.406257
Std. Dev.	0.096003	0.122809	0.148099	0.247417	0.055478	3.462677
Skewness	0.292182	0.365768	0.745980	-0.122877	0.628702	0.471794
Kurtosis	1.414621	1.980995	2.024411	1.558680	1.720485	3.289961
Jarque-Bera	4.044456	2.229150	4.501769	3.028546	4.559148	1.380448
Probability	0.132360	0.328055	0.105306	0.219968	0.102328	0.501464
Sum	-122.5398	-157.6238	-167.2501	-167.0679	150.7641	157.6158
Sum Sq. Dev.	0.304149	0.497709	0.723800	2.020104	0.101566	395.6743
Observations	34	34	34	34	34	34

Table 6.3 presents the symmetrical distribution of household consumption spending (LCONSPc), government social spending on education (LEDUpc), health (LHEApc),

social protection (LSOPpc), household disposable income per capita (LDIpc) and real interest rate (RIR). According to the descriptive results for mean, median and skewness, all variables are normally distributed since the mean and median values are almost identical and the skewness values are close to zero. The data of LCONSpC, LEDUpC, LHEApC, LDIpc and RIR is positively skewed because its distribution is larger right-tailed compared to left-tailed. The distribution for LRSOPpc is negatively skewed because the data is longer left tailed relative to the right.

There is a small change between the minimum and maximum values, implying that the series is stable for the study period. Household consumption spending, government social spending on education, health, social protection, household disposable income per capita follow a platykurtic distribution since the kurtosis values are below three. However, the real interest rate follows a leptokurtic distribution since its kurtosis value is greater than three. Therefore, the Jarque–Bere statistics values and its corresponding p-values (probability) indicate that all variables employed are normally distributed.

6.3 STATIONARITY ANALYSIS

The evaluating of time series regression requires that the variables employed be checked whether they are stationary or non-stationary. Therefore, if the variables are non-stationary in level form then differencing procedure will be applied, which would induce the series to become stationary, to avoid a spurious regression which generates a meaningless result.

The present study utilizes formal techniques, and ADF and PP tests to determine whether the series is stationary and the order of integration. The null hypothesis of this tests states that the series is non-stationary (has a unit root). The null hypothesis is accepted when the calculated statistic values of each model are below the corresponding Mackinnon (1996) critical values. However, when calculated statistic values are greater than the corresponding critical values, the null hypothesis is rejected in favour of the alternative.

The stationary assessment under the ADF and PP approaches can be performed using three models: neither the intercept (constant), intercept with trend and none. Consequently, the study has adopted the Asterious and Hall (2011) method to identify the appropriate model. This approach determines the significance of the restriction

condition in order to decide which deterministic components (if any) should be included in each series unit root equation. For example, if GDP per capita coefficient (LGDPpc), the model which incorporates constant and the trend is found to be statistically significant, the study adopts the restriction. However, if the constant and the trend is insignificant, the subsequent restriction (only intercept) is to be evaluated. Hence, if none of the deterministic conditions appears to be statistically significant, no restrictions are imposed. The same procedure is followed for other variables.

Therefore, the results from both ADF and PP tests, presented in tables A1 and A2 (Appendix A), respectively, indicate that the null hypothesis is accepted when LGDPpc, LEDUpc, LHEApc, LSOPpc, LCONSpC, LGINI, LMS, LDlpc, RIR are in levels. These results indicate the existence of unit root. When the variables are first-differenced, both ADF and PP test results indicate that the null hypothesis is rejected in favour of the alternative hypothesis. Therefore, these variables are first difference stationary and integrated of order one $I(1)$. However, ADF and PP tests show that the null hypothesis is rejected when LREER is in level. Consequently, LREER is stationary in level and integrated of order zero $I(0)$. In conclusion, the series integrated of mixed order $I(1)$ and $I(0)$ and the applicable econometric methodology to employ is the Autoregressive Distributed Lag(ARDL) approach. Thus, the cointegration relationship is assessed through the ARDL Bound test, before continuing to estimate long run and short run relationship for growth, Gini and consumption model. If the bound test reveals that no cointegration in the model, only short run regression will be estimated.

6.4 THE AUTOREGRESSIVE DISTRIBUTED LAG (ARDL) FOR GROWTH MODEL

This section presents the analysis of the ARDL model through which the study assesses the association between government social spending (education, health, social protection) and economic growth. The existence of a long run relationship between the government social spending variables and Real GDP per capita is confirmed by the ARDL Bound results, as shown in sub-section 6.4.1, while the long run estimates results are reported in sub-section 6.4.2. The short run estimates results are presented sub-section 6.4.3, and sub-section 6.4.4 shows the diagnostic results. Sub-section 6.4.5 reports the stability results and lastly, sub-section 6.3.6 presents the overall discussion of results.

6.4.1 The ARDL Bound Test Results for Growth Model

The ARDL bound test is employed to check whether there exists a cointegrating relationship between the endogenous variables and the regressors. The null hypothesis of this test assumes that there is no cointegration ($H_0: \beta_4 = \beta_5 = \beta_6 = \beta_7 = \beta_8 = 0$) in the estimated model. However, alternative hypothesis indicates the existence of cointegration with no coefficient equal to zero ($H_0: \beta_4 \neq \beta_5 \neq \beta_6 \neq \beta_7 \neq \beta_8 \neq 0$). When the computed F-statistics is below the lower bound critical value, the null hypothesis is accepted. However, if the F-statistic value is above the upper bound critical value, the null hypothesis is rejected in favour of the alternative hypothesis. When the f-statistics value is between the lower and upper bound, the results are inconclusive, and therefore the ARDL short run model can only be estimated. Therefore, in order to estimate the ARDL bound test, the lag lengths that will be included in the model must be determined. Hence, for the lag selection criteria, the AIC is used, which is automatically chosen. According to Perseran *et al.* (1990), it is not necessary for the employed variables to have the same lag length. Thus, the AIC approach select the ARDL-AIC (1, 2, 2, 1, 1, 2) model is estimated (see Table A1, Appendix A). Table 6.4 presents the bound test results for growth model.

Table 6.4: The Bound Test Results for Growth Model

F-statistics	$\theta = 0.05$		$\theta = 0.10$	
	Lower Bound	Upper Bound	Lower Bound	Upper Bound
4.903211	3.12	4.25	2.27	3.79

Notes: θ denotes the level of significance

The results indicate the existence of a cointegrating relationship between government social spending on education, health, social protection, real money supply, real effective exchange rate and economic growth. The F-statistics value of 4.90 is higher than upper bound critical values at 5% and 10 (higher than all the critical values) level of significance. Therefore, the null hypothesis of no cointegrating relationship is rejected since a cointegrating relationship was found. Hence, the results are aligned with the alternative hypothesis.

6.4.2 The Long run Estimates Results for Growth Model

When the existence of cointegrating relationship has been identified, the long run equilibrium effect between real GDP per capita (LGDPpc) and government social spending on education (LEDUpc), health (LHEApc), and control variables money supply (LMS) and real effective exchange rate (LREER) may be discussed. Therefore, Table 6.5 depicts the ARDL long run results. If regressors have a statistically significant impact on the endogenous variable the null hypothesis 1, which states that government social spending does not have a significant impact on economic growth, will be rejected, but if social spending variables have an insignificant impact, the null hypothesis 1 accepted. This implies for both short run and long run estimation results.

Table 6.5: The Estimated ARDL Long Run Equation for Growth Model

ARDL (1,2,2,1,1,2) Long run Coefficient based on AIC Model, LGDPpc is the dependent variable.

Regressor	Coefficient	Standard Error	T-Ratio (p-value)
LEDUpc	0.239	0.299	0.796(0.438)
LHEApc	0.348	0.119	2.912(0.010)
LSOPpc	0.159	0.079	2.023(0.060)
LMS	0.404	0.087	4.645(0.000)
LREER	-0.250	0.123	-2.037(0.058)
C	4.191	1.066	3.931 (0.001)
Trend	-0.009	0.003	-3.211(0.005)

The long run elasticity coefficient for government social expenditure on health, social protection and money supply has a positive and significant impact on economic growth. Also, government spending on education is positively related to economic growth, however, the impact is insignificant., while the real effective exchange rate has negative and statistically significant (at 1% level) effect on economic growth. Government social spending on education (LEDUpc) has a positive effect on economic growth long run, however, the long run education elasticity of 0.24% is insignificant. The results were unexpected. However, Bosupeng (2015) also found that during a long run, education expenditure had an insignificant impact on economic

growth in Botswana. Therefore, since education spending does not have a significant impact on economic growth during the long run, the study accepts null hypothesis 1.

The long run elasticity of health spending is 0.35 (significant at 1 % level of significant). Therefore, when government social spending on health increase (LHEApc) by 1%, then real GDP per capita (LRGDPpc) will rise by 0.35% in the long run. The findings are in line with theoretical assumptions. Thus, at an empirical level, Basher and Khan (2015); Gurgul and Lack (2011); Beraldo *et al.* (2009), and Li and Haung (2009) found that social spending on health stimulates economic growth. Thus, null hypothesis 1 is rejected.

The estimated social protection elasticity for real GDP per capita (LGDPpc) is 0.16% and significant at a 10% level of significance. This means that an increase in social protection spending (LSOPpc) by 1% stimulates economic growth 0.16%. The findings contradict with the theoretical assumption, but Khan and Basher (2015) found that social welfare spending for Australia stimulates economic growth in the long run. Since social protection has cause variation in growth, null hypothesis 1 is rejected.

The long run elasticity of money supply (LMS) is 0.40% and significant at 1% level of significance. The positive relationship between money supply and economic growth (LGDPpc) is supported by both economic theory and empirical evidence, such as Chaitip *et al.* (2015) and Dingela and Khobai (2017), who generated similar results. Thus, null hypothesis 1 is rejected in favour of the alternative hypothesis. The estimated real effective exchange rate elasticity (LREER) for real GDP per capita (LGDPpc) is -0.25% and significant at 10% level of significance. Therefore 1% appreciation of South African currency will cause economic growth to decline by 0.25%. Therefore, LREER has a negative and significant effect on growth, the findings were expected. The study by Habib *et al.* (2016) generated the same findings. Thus, the null hypothesis is rejected as a shock in LREER cause variation in economic growth.

6.4.3 Short run Estimates Results for Growth Model

After the confirmation of the existence of long run proceed and estimate, the ARDL (1, 2, 2, 1, 2, 1) Error Correction Regression is shown in Table 6.6

Table 6.6: The ARDL-ECM Short run estimates for Growth Model

The Error Correction Representation of the ARDL (1,2,2,1,1,2) based on AIC criteria

Regressor	Coefficient	Standard Error	T-Ratio (p-value)
DLEDUpc	0.388	0.085	3.126(0.007)
DLHEApc	-0.209	0.060	-3.454(0.003)
DLHEApc(-1)	-0.367	0.078	-4.7599(0.0002)
DLSOPpc	0.044	0.018	2.483(0.024)
DLMS	0.367	0.037	9.807(0.000)
DLREER	-0.114	0.031	-3.625(0.002)
DLREER(-1)	0.071	0.028	2.508(0.023)
C	4.191	0.676	6.196(0.000)
DTrend	-0.009	0.002	-5.931(0.000)
ECM(-1)	-0.561	0.090	-6.214(0.000)

The error correction term (-0.56) carries the appropriate sign (i.e., negative) and the value is statistically significant at 1%. This proposes that the system will converge back to equilibrium by approximate 56% yearly after the previous disequilibrium. The results also propose that when real GDP per capita increases above its long run structural average by 1% in the previous period, it adjusts downwards by 56% in the following period, therefore implying that it would require 1.79 years for the system to be fully restored in equilibrium. The significance of the ECM value confirms that social spending on education, health, social protection, housing and money supply, and real effective exchange rate, all jointly cause economic growth in the long run.

The error correction regression also displays the behaviour of lagged regressors in a short run. The ARDL system drops insignificant variables during the short run. Therefore, all dropped variables in the models are interpreted as insignificant. Summing the lagged coefficients of a particular variable will indicate the overall short run term effect of that variable on the dependent variable. Therefore, if the short run variable has more than one lagged coefficient, the study will be summing the statistically significant coefficient in order to get the overall short run effect. Therefore, the summing of statistically significant coefficients of social spending on education (LEDUpc) reveal that LEDUpc causes real GDP per capita to expand by 0.60% during

the short run. Therefore, the null hypothesis 1 is rejected, since education has a significant impact on economic growth. The summing of statistically significant coefficients of social spending on health (LHEApc) indicates that LHEApc causes real GDP per capita to reduce by -0.58% during the short run. The short run impact was unexpected, but Mura (2014) generated the same results. Thus, null hypothesis 1 is rejected.

The short run social protection (LSOPpc) elasticity 0.04% is statistically significant at 5% level of significance. This means that the positive variation of 0.04% in real GDP per capita (LGDPpc) comes from social protection spending. Consequently, the null hypothesis 1 is rejected in favour of the alternative hypothesis. When the Central Bank decides to increase the money supply (LMS) by 1%, real GDP per capita is expected to increase by 0.37% during the short run (at 1% level of significance). The study rejects null hypothesis 1. The overall short run effect indicates that the real effective exchange rate (LREER) cause economic growth to decline by -0.04%. Even in the short run, the appreciation of the South African currency has a negative impact on economic growth. Therefore, null hypothesis 1 is rejected since LREER has a significant impact on economic growth in the short run.

6.4.4 The Diagnostic Analysis for Growth Model

After estimating the long and short run dynamics the model's pathologies are examined. The diagnostic tests are essential as they can prevent the analyzing of a spurious model. Therefore, the overall ARDL model's performance and goodness-of-fit show robust estimation results (see Table B1, Appendix B). Based on the F-statistic value, the model is highly statistically significant. The results' diagnostic test indicates that there is no sign of serial correlation, the residuals are normally distributed, no misspecification and finally the disturbance are homoscedastic (see Appendix B, Figure B1 and Tables B4,5, & 6). Therefore, this is the best model to estimate, since the model meets the Gaussian conditions as it passes all the diagnostic tests.

6.4.5 Stability Test for Growth Model

Finally, the study checked the stability of the model by employing the recursive residuals (Cusum) and the cumulative sum of squares residuals (CusumsQ). The results are depicted in Figure B2, Appendix B. Therefore, according to Cusum and

CusumQ results, the model is structurally stable since both plots are within critical bound 5% significant.

6.4.6 The Discussion of Results for Growth Model

The ARDL bound test for growth model proposes the existence of a cointegration relationship between government social spending on education, health, social protection, money supply, real effective exchange rate and real GDP per capita, therefore, permitting the study to estimate both long run and short run relationship. The overall model results indicate that government social protection spending and money supply have induced positive variation in economic growth during both short run and long run.

According to Barro (1990), non-productive expenditure (such as social protection) does not change the efficiency of firms, and thus cannot contribute to economic growth. The findings are in line with the empirical evidence of Khan and Basher (2015). Therefore, the results are plausible in South Africa, where more than 11 million people depend on social grants to provide their daily needs. Therefore, social protection spending channels economic growth indirectly through its impact on household consumption. Money supply boosts economic growth during both short run and long run.

The results indicate the essential role played by monetary policy in stimulating the South African economy. According to the theoretical framework, when the Central Bank increases money supply, this would cause real interest rates to decline and stimulate both investment and national output produces. Therefore, an increase in the money supply boosts economic growth. The behaviour of the real money supply is supported by economic theory and empirical evidence (Dingela and Khobai, 2017).

The rise in the real effective exchange rate (appreciation of South African currency) causes economic growth (LGDPpc) to decline in short run and long run. The finding was expected since the appreciation of the South African currency makes domestic goods to be expensive. The foreign countries find South African goods expensive, and as a result, the net exports decrease. South African citizens then find domestic goods expensive compared to import goods. Therefore, the changes in exports and imports result in a balance of trade deficit. The decline of exported goods and trade deficits cause the gross domestic products to reduce.

Public investment in health is negatively associated with economic growth during the short run. The outcome was not expected, however, Mura (2014) also drew the same conclusion. Therefore, further research is necessary to determine the short run relationship between health spending and economic growth. However, the finding that public investment in health promotes economic growth in South Africa, during the long run is as expected. According to Asghar *et al.* (2011), a healthier employee is more productive and can earn more income, and thus boost economic growth.

Government investment in education stimulates economic growth during short run. However, education spending has an insignificant impact in long run. Therefore, the long run results contradict with economic theory, since investment in education is assumed to be a determinant of long run growth. However, Bosupeng (2015) also found similar results in Botswana. This finding may also be plausible in the case of South Africa.

The notable lack of significant impact between education and economic growth could be caused by various factors. Firstly, it may arise from the choice of proxy, since the employed variable presents total government education expenditure which includes primary, secondary and tertiary spending. According to economic theory and previous empirical evidence, only tertiary education is capable of simultaneously stimulating human capita and sustainable economic growth, whereas primary and secondary education does not enhance economic growth (Bella *et al.*, 2017; Bloom *et al.*, 2013; Chude & Chude, 2013; Lucas, 2009). Secondly, the employed education variable presents quantity and not quality. Thirdly, the increase in education expenditure does not affect the production of the economy.

Fourthly, an important factor which may distort the positive impact of government expenditure on economic growth is the high unemployment rate that exists in South Africa. The country suffers from structural unemployment, which is a result of a mismatch between what employers require and skills possessed by the students. Thus, statistics reports indicate that the annual number of graduates who are unemployed is increasing.

6.5 THE AUTOREGRESSIVE DISTRIBUTED LAG (ARDL) FOR THE GINI MODEL

The study also employs the ARDL approach to assess the effect of government social spending on income inequality. Once again, government social spending on education, health and social protection variables were employed. The Gini coefficient was used as a proxy for income inequality. The model also included household disposable income per capita (LDIpc) and real interest (RIR) as control variables, and a dummy variable for democracy, which plays an important role in the evolution of social expenditure in South Africa. Due to limited data for the Gini coefficient, the study period declines and covers 1983 to 2015.

The ARDL bound results presented in sub-section 6.5.1 indicate the existence of a long run relationship between the variables of interest. The long run elasticity coefficients results are reported in sub-section 6.5.2. While the sub-section 6.5.3 shows the short run elasticity coefficients results, followed by sub-section 6.5.4 which presents the diagnostic test results. Sub-section 6.5.5 reports the stability results for the model and finally, the discussion of results is presented in subsection 6.5.6.

6.5.1 The ARDL Bound Test Results for Gini Model

To ascertain whether there exists a long run relationship between income inequality and disaggregated government social spending, the study estimates the ARDL bound test. The null hypothesis will hold if the F–statistic value is below the lower bound critical value. However, if the F–statistic is above the upper bound critical value, the alternative hypothesis, which indicates the existence of a long run relationship between the endogenous variable and its regressors, is accepted. The standard procedure before estimating the ARDL model is to determine the lag lengths to be included in the model. Thus, the researcher employs the AIC as the lag selection criteria. The AIC approach selects the ARDL (1, 0, 2, 3, 2, 0) model to be estimated and is presented in Table B1, Appendix B. Table 6.7 shows the bound test results for the Gini model.

Table 6.7: The Bound Test Results for the Gini Model

F-statistics	$\theta = 0.05$		$\theta = 0.10$	
	Lower Bound	Upper Bound	Lower Bound	Upper Bound
17.29873	3.12	4.25	2.75	3.79

Notes: θ denotes the level of significance

The results represented in Table 2 for ARDL (1,0,2,3,2,0) suggest the existence of long run relationship between Gini coefficient and disaggregated government social spending variables on education, health, social protection, household disposable per capita income and real interest rate. Since the F-statistics value of 17.29873 is above the upper bound critical values at 5% and 10% level of significance, the null hypothesis of cointegration relationship is rejected in favour of the alternative hypothesis, which proposes a cointegrating relationship in the estimated model. Therefore, the study can proceed to estimate the long run and short run dynamics within the ARDL framework.

6.5.2 The Long run Estimates Results for Gini Model

After the confirmation of the cointegrating relationship from the Bound test the long run equilibrium effect between government social spending and income inequality is assessed. Thus, Table 6.8 presents the long run results for the Gini model. Notably, if explanatory variables have a statistically significant impact on the dependent variable, the null hypothesis 2, which states that government social spending does not have a significant impact on income inequality, will be rejected. However, if social spending variables have an insignificant impact, the null hypothesis 2 accepted.

Table 6.8: The Estimated ARDL Long Run Estimates for Gini Model

ARDL (1,0,2,3,2,0) Long run Coefficient based on the AIC Model, Gini is the dependent variable.

Regressor	Coefficient	Standard Error	T-Ratio (p-value)
LEDUpc	-0.049	0.011	-4.453 (0.001)
LHEApc	-0.055	0.009	-5.815(0.000)
LSOPpc	0.059	0.005	11.111(0.000)
LDIpc	-8.462	0.816	-10.372(0.000)
RIR	0.0003	5.400	6.986(0.000)
C	8.960	0.978	9.159(0.000)
Trend	0.006	0.001	9.149(0.000)

The long run elasticity coefficient for all regressors is statistically significant at 1% level of significance. Thus, social spending on education, health and household disposable income per capita all have a negative effect on income inequality, whereas social protection spending and real interest rate are positively linked to income inequality. The long run elasticity of education spending is -0.05% and is significant at 1% level of significance. Therefore, when the government increases education spending (LEDUpc) by 1%, income inequality (LGINI) will decline by -0.05%. The results correspond with economic theory as an investment in education has an equalizing effect on income distribution. Therefore, null hypothesis 2 is rejected, since the long run coefficient is statistically significant.

The empirical results of Kirim (2015), Sylwester (2002), Claus *et al.* (2012) and Ospina (2010) also reveal that public investment in education reduces income inequality. The long run coefficient for health expenditure (LHEApc) of -0.06% indicates a negative impact on income inequality (significant at 1% level of significant). Thus, null hypothesis 2 is rejected since health spending has a significant impact on income inequality. The studies by Anderson *et al.* (2017), D'Agostino *et al.* (2016) and Claus *et al.* (2012) also conclude that government investment into health sector improves income distribution within a society. The results on education and health spending were expected. According to Asghar *et al.* (2011), an educated and healthier person

is more productive and able to earn a high income compared to the unskilled and unhealthier individual, and thus improve the standard of living.

The estimated social protection (LSOP_{pc}) elasticity for Gini coefficient (LGINI) is 0.06% and significant at 1% level of significance. Therefore, the increase in government social protection spending by 1% causes income inequality to decline by 0.6%. The findings were expected. Consequently, null hypothesis 2 is rejected since social protection has a significant impact on income inequality. The empirical results of Foster (2012), Claus *et al.* (2012) and Ospina (2010) indicate that social protection spending (welfare) positively associated with income inequality.

The long run elasticity of disposable income per capita (LDI_{pc}) is -8.46% and significant at 1% level of significance. When disposable income per capita (LDI_{pc}) expands by 1%, income inequality is expected to decline by -8.46%. The results correspond with consumption theories. Consequently, null hypothesis 2 is rejected. The results also suggest that real interest rate (RIR) is positively associated with income inequality, with the long run elasticity of 0.0003% significant at 1% level of significance. Thus, a positive relationship was expected. Taghizadeh-Hesary *et al.* (2018) also reported that a rise in lending rate promotes income inequality.

6.5.3 Short run Estimates Results for Gini Model

After the interpretation of long run findings, the study examines short run estimates. Table 6.9 depicts the ARDL (1, 0, 2, 3, 2, 0) Error Correction Regression for growth model.

Table 6.9: The ARDL-ECM Short Run Estimates for the Gini Model

The Error Correction Representation of the ARDL (1,0,2,3,2,0) based on AIC criteria

Regressor	Coefficient	Standard Error	T-Ratio (p-value)
DLHEApc	-0.014	0.004	-3.339(0.005)
DLHEApc(-1)	0.038	0.006	6.413(0.000)
DLSOPpc	0.018	0.002	9.626(0.000)
DLSOPpc(-1)	-0.026	0.003	--8.833(0.000)
DLSOP(-2)	-0.015	0.002	-7.412(0.000)
DLDIpc	-32.134	4.208	-7.636(0.000)
DLDIpc(-1)	14.052	3.594	3.912(0.0002)
C	8.960	0.754	11.878(0.000)
DTrend	0.006	0.0005	11.730(0.000)
Dummy	-0.006	0.0006	-9.116(0.000)
ECM(-1)	-1.017	0.086	-11.867(0.000)

The error correction term coefficient is -1.02 and is statistically significant with the expected sign (negative). However, the model is overcompensating following a short run disequilibrium, more than 100% is corrected in the first period. The model is overshooting and it overcompensates by 2%. The error correction coefficient also shows the long run causality running from government social spending on education, health social protection, household disposable income per capita and real interest rate.

Apart from the error correction information, lagged variables are presented in a short run. The ARDL system drops insignificant variables during the short run. Therefore, all dropped variables will be reported as insignificant. The interpretation of the short run results also adopted the method used in a growth model that sums the statistically significant lagged coefficient of each variable to determine the overall short run impact on the dependent variable. Therefore, the summed value of statistically significant lagged coefficients for social spending on health (LHEApc) reveals that public health promotes income inequality (LGINI) by 0.02% at 1% level of significance. The null hypothesis 2 is rejected since public investment in health has a significant effect on income inequality.

The summation of the statistically significant lagged coefficients for social protection spending (LSOPpc) and disposable income per capita (LDIpc) caused the negative

variation of 0.02 % and 18.08% in income inequality, respectively, at 1% level of significance. Therefore, null hypothesis 2, for both social protections spending and household disposable income per capita, is rejected. During the short run, both public spending on education (LEDUp_c) and the real interest rate (lending rate) have an insignificant impact on income inequality. Finally, the dummy coefficient indicates that democracy is negatively associated with income inequality, with the elasticity of -0.006%. These results suggest that democracy stimulates income equality in society. Ospina (2010) also generated this negative relationship between these variables.

6.5.4 The Diagnostic Results for the Gini Model

After the interpretation of short run dynamics, the model's pathologies were checked. The ARDL Gini model fits very well (see Table C1, Appendix C). Thus, based on the F-statistic value, the model is highly statistically significant. The diagnostic test indicates that there is no sign of serial correlation, the residuals are normally distributed, there are no misspecification and the disturbance are homoscedastic (see Appendix C, Figure C1 and Tables C4, 5 & 6). Therefore, the model (1, 0, 2, 3, 2, 0) is the best model to estimate, as it meets the Gaussian conditions.

6.5.5 Stability Results for the Gini Model

The study examined the stability of Gini model through the recursive residuals with Cusum and Cusum of Squares tests. The results are presented in Figure C2, Appendix C. According to Cusum and Cusum of Squares, the model is stable in the long run since both plots are within the critical bound of 5% significance.

6.5.6 The Discussion of Results for Gini Model

The ARDL bound test indicates the existence of a cointegration relationship between government social spending on education, health, social protection, disposable income per capita, real interest rate and income inequality. Therefore, the study proceeds and estimate the long run and short run relationship.

The short run results indicate that social spending on education and health fails to support equality in the distribution of income in South Africa. Education has a significant impact on income inequality and health-positive impact. According to Sánchez and Cicowiez (2014), investment in education and health takes time to translate into higher returns in productivity, since the graduates and learners undergo

more than one education cycles. Therefore, pay-off from this investment may be enjoyed in the long run.

Consequently, the short run results for education and health spending are plausible, but the long run findings indicate that public investment in education and health have an equalizing impact on income distribution. The results correspond with the economic theory and empirical evidence of Anderson *et al.* (2017) and Karim (2015). Investment in public education and health starts to generate returns in the long run.

Disposable income per capita reduces income inequality in both long run and short run. Disposable income per capita is highly elastic in both short run and long run, with a magnitude of -8.46% in the long run. The results also indicate disposable income per capita has a greater effect on income inequality than compared to other independent variables. Disposable income plays an essential role in promoting equality in income distribution in the South African economy, which is one of the macroeconomic objectives of the country.

Government social protection expenditure has an equalizing effect on income distribution during the short run. This suggests that social grants provided by the state reduce income inequality. The outcome contradicts Armstrong and Burger's (2009) finding, since they reported that social grant has an insignificant impact on income inequality. D'Agostino *et al.* (2016) also declared social welfare spending to improve income inequality. However, during the long run, public investment in social protection promotes income inequality. The results are as expected and correspond with both economic theory and empirical evidence (Claus *et al.*, 2012; Foster, 2012) and Ospina, 2010).

While the real interest rate (lending rate) has an insignificant impact on income inequality during the short run, the lending rate promotes income inequality through its positive association in the long run. When real interest rates increase (lending rate), the poor households fail to secure loans, while the wealthy households are able to access loans. This causes the income gap to increase between the rich and poor people and increasing income inequality. The democracy dummy is negative related to income inequality. Consequently, democracy improves income distribution. The results were expected since in a democratic regime, all people have the same rights and are given equal opportunities. However, the change brought about by democracy

in South Africa is inelastic and very small. Thus, the ARDL (1, 0, 2, 3, 1, 1, 2) Gini model was the best model to be estimated, since it does not suffer from serial correlation, heteroscedasticity, mis-specification, and is normally distributed.

6.6 THE AUTOREGRESSIVE DISTRIBUTED LAG (ARDL) FOR THE CONSUMPTION MODEL

The ARDL methodology is also used to examine null hypothesis 3, which suggests that government social spending does not have a significant impact on household consumption expenditure. The utilised variables were government social spending on education (LEDUp_c), health (LHEAp_c) and social protection (LSOPp_c) and household consumption expenditure (LCONSp_c), as the dependent variable. This model also uses disposable income per capita (LDIpc) and the real interest rate (RIR) as control variables. For this model, the period observed spans from 1983 to 2016. The ARDL bound result is depicted in sub-section 6.6.1, which indicates the existence of a long run relationship between the observed variables. The long run elasticity coefficients results are reported in sub-section 6.6.2. Sub-section 6.6.3 presents the short run elasticity coefficients results, followed by sub-section 6.6.4, which depicts the diagnostic test results. The stability results are presented in sub-section 6.6.5 and finally, the sub-section 6.6.6 presents the discussion of results.

6.6.1 The ARDL Bound Test Results for Consumption Model

To assess the long run relationship between disaggregated government social spending and household consumption expenditure, the study estimated the ARDL bound test. When the F-statistic value is below a lower bound critical value, the null hypothesis is accepted. However, it is rejected if F-statistic is above the upper bound critical value, which indicates the existence of a long run relationship between the endogenous variable and its regressors. Conversely, for lag selection, the AIC was employed, which is automatically selected by the system, and thus the AIC lag selection criteria selected the ARDL-AIC (2,0,1, 0,0,1) model which is shown in Table D1, Appendix D. Table 6.10 presents the bound test results for consumption model.

Table 6.10: The Bound Test Results for Consumption Model

F-statistics	$\theta = 0.05$		$\theta = 0.10$	
	Lower Bound	Upper Bound	Lower Bound	Upper Bound
8.929989	3.12	4.25	2.75	3.79

Notes: θ denotes the level of significance

The bound test results presented in the above table indicate that the F-statistic value of 8.93 is higher than the higher bond critical value at 10% and 5% level of significance. This indicates the existence of a long run relationship between the endogenous variable (household consumption expenditure) and its regressors (LEDUp_c, LHEAp_c, LSOPp_c, LDlp_c and RIR). Therefore, the null hypothesis of no cointegration relationship is rejected in support of the alternative hypothesis. The study was able to progress and estimate the ARDL long run and short run dynamics.

6.6.2 The Long Run Estimates Results for Consumption Model

After the bound test result indicated the presence of the cointegrating relationship in the model, the long run equilibrium effect between government social spending and household consumption spending was assessed. Table 6.11 depicts the ARDL long run results. Notably, if explanatory variables have a statistically significant impact on the dependent variable, the null hypothesis 3, which states that government social spending does not have a significant impact on household consumption, will be rejected. However, if social spending variables have an insignificant impact the null hypothesis 3 is accepted.

Table 6.11: The Estimated ARDL Long Run Estimates for Consumption Model

ARDL (2, 0, 1, 0, 0, 1) Long run Coefficient based on the AIC Model, LCONSpC is the dependent variable.

Regressor	Coefficient	Standard Error	T-Ratio (p-value)
LEDUpC	0.078	0.167	0.471(0.643)
LHEApC	-0.331	0.149	-2.226(0.037)
LSOPpC	-0.104	0.045	2.299(0.032)
LDIpc	1.162	0.219	5.317(0.000)
RIR	-0.002	0.0009	-2.267(0.034)
C	-7.172	1.608	-4.462(0.001)
Trend	0.003	0.001	2.429(0.024)

Government spending on education (LEDUpC), social protection (LSOPpC) and household disposable income per capita (LDIpc) are positively related to household consumption expenditure in the long run. However, only social protection and household disposable variables income are statistically significant at 5% and 1%, respectively. Social spending on health (LHEApC) and real interest rate (RIR) have negative and significant (at 5% level of significant) impact on household consumption expenditure. According to the results for social spending on education, LEDUpC is positively associated with household consumption expenditure. However, for LEDUpC, the long run coefficient of 0.08% is insignificant. Therefore, null hypothesis 3 is accepted, since the education coefficient is insignificant. The results were surprising, but Barnett and Brooks (2010) also concluded that public investment in education had an insignificant impact on household consumption in China.

The long run elasticity of health expenditure (LHEApC) is -0.33% and significant at 5% of significance. When government social spending on health increase by 1%, then household consumption declines by 0.33%. The findings were not expected. Coady *et al.* (2010) and Barnett and Brooks (2010) revealed that public investment in health promotes household consumption expenditure. The unexpected results generated by this study makes further research necessary for this area. Thus, null hypothesis 3 is rejected since health spending has a significant effect on the household.

The estimated social protection spending elasticity for household consumption expenditure (LSOPpc) is 0.10% and significant at 5% level of significance. Therefore, household consumption expenditure expands by 0.10% when the government increases social protection expenditure (LSOPpc) by 1% during the long run. The results were expected and are also supported by empirical evidence of Barrientos (2012). Null hypothesis 3 is rejected.

The long run real interest rate elasticity (RIR) of -0.002 is significant at 5% level of significance. Therefore, the real interest rate, which is the lending rate, is negatively linked to household consumption expenditure during the long run. The results correspond to both theory and empirical evidence (Osei-Fosu *et al.*, 2014). Consequently, null hypothesis 3 is rejected. When disposable income per capita (LDIpc) increase by 1%, household consumption expenditure will expand by 1.16%. Disposable income per capita coefficient is significant at 1% level of significant and highly elastic. Therefore, the results are consistent with both the consumption theory and the empirical evidence of de Bonis and Silvestrini (2012); Diacon and Maha (2015), and Adedeji and Adegboye (2013). According to the results of the household, disposable income is the most important factor in the household consumption pattern. Thus, null hypothesis 3 is rejected.

6.6.3 The Short Run Estimates Results for Consumption Model

After the discussion of the long run results, the study interpreted the short run estimate for the consumption model. Table 6.12 presents the ARDL (2, 0, 1, 0, 0, 1) Error Correction Regression.

Table 6.12: The ARDL-ECM Short Run Estimates for Consumption Model

The Error Correction Representation of the ARDL (2,0,1,0,0,1), based on AIC Criteria

Regressor	Coefficient	Standard Error	T-Ratio (p-value)
DLCONSpC(-1)	0.468	0.099	4.738(0.000)
DLHEApc	-0.041	0.066	-0.615(0.545)
DRIR	-0.003	0.0006	-4.913(0.000)
C	-7.172	0.881	-8.142(0.000)
DTrend	0.003	0.0004	7.667(0.000)
ECM(-1)	-0.748	0.092	-8.145(0.000)

The short run adjustment coefficient of the cointegration equation -0.74 is statistically significant at 1% and exhibits the appropriate sign (negative). Conversely, the system is expected to converge back to equilibrium by approximate 74% after the previous period's disequilibrium. Furthermore, when household consumption expenditure (LCONSpC) rises above its long run structural average by 1% in the previous period, it adjusts downwards by 74% in the following period, suggesting that it would require 1.35 years for the system to be fully restored in the equilibrium. Thus, the significance of the error correction term also implies that social spending on education, health, social protection, disposable income per capita and real interest rate jointly cause household consumption expenditure in the long run.

The ARDL system drops insignificant variables during the short run. The positive variation in the household consumption expenditure (LCONSpC) is driven by its own lags, with short run coefficients of 0.47%. While the long run elasticity of interest rate is 0.003% and significant at 1% level of significance. When the real interest rate (RIR) increases by 1%, household consumption expenditure will decline by 0.003% during the short run. The results correspond with the theoretical framework. Health spending (LHEApc) is ineffective to bring change in household consumption expenditure during the short run because its elasticity coefficient of -0.04% is statistically insignificant. Therefore, null hypothesis 3 is accepted. Government spending on education, health,

social protection and disposable income have an insignificant impact on household consumption expenditure in the short run. Furthermore, null hypothesis 3 is accepted for all social spending variable LEDUp_c, LHEAp_c, SOPp_c and disposable income. The insignificant of the short run coefficient for education, health and social protection related to household consumption expenditure was unexpected and results further research is required.

6.6.4 The Diagnostic Analysis for Consumption Model

After analyzing the behaviour of government social expenditure coefficients and household consumption spending in the long run and of short run dynamics, the study proceeded to check the model's pathologies. Based on the F-statistic value, the model is highly statistically significant (see Table D1, Appendix D). The diagnostic test suggests that there is no sign of serial correlation, the residuals are normally distributed, there are no misspecification and the disturbance are homoscedastic (see Appendix D, Figure D1 and Tables D4, 5 & 6). Therefore, model (2, 0, 1, 0, 0, 1)) is the best model to estimate, as it meets the Gaussian conditions.

6.6.5 Stability Results for Consumption Model

The study assessed the stability of the model by employing the recursive residuals (Cusum) and the cumulative sum of squares residuals (CusumsQ). The results are shown in Figure D2, Appendix D. According to Cusum and CusumQ, the results of the model are structurally stable since both plots are within critical bound 5% significance.

6.6.6 Discussion of Results for Consumption Model

This section discusses the results for long run and short run dynamics for the consumption model. The model estimated the contribution of government social (education, health and social protection) spending on household consumption expenditure. The ARDL bound test for consumption model revealed that there is a cointegration relationship between endogenous variables and the explanatory variables. Therefore, permitting the evaluation of long run estimates and short run estimates, government spending on education has an insignificant impact on household consumption expenditure during both short run and long run. The resulting conflict with the theoretical framework. However, Barnett and Brooks' (2010) empirical results reveal that public spending on education has an insignificant impact on household consumption in China. The reasons for such unexpected results may be

caused by the employed proxy for education expenditure, which is total government spending on education (tertiary, secondary and primary). Also, when the quality of education is poor, the returns are expected to be low.

According to the results, social spending on health is unsuccessful in stimulating household consumption expenditure in South Africa, because health spending has an insignificant effect during the short run, and the negative impact it has on long run. The negative and insignificant impact may be caused the proxy which is total government spending on health. Other studies have used a life expectancy variable, mortality, to access how health contributes to the economy. It may be that the public health care system does not offer a quality service that stimulates the health of South African citizens. While social protection spending does not affect household consumption in the short run it stimulates household consumption expenditure during in the long run.

With the majority of South African holds depending on social grants for daily consumption, government social transfers stimulate household consumption in the long run. The disposable income per capita has stimulated household consumption in the long run and the effect is highly elastic. Thus, the results also indicate that household disposable income has a greater impact on household consumption expenditure compared to other regressors. The findings are supported by both the consumption theory and the empirical evidence of Bakri *et al.* (2017); De Bonis and Silvestrini (2012), and Diacon and Maha (2015). In South Africa, disposable income plays an essential role in boosting economic development. While the real interest rate (lending rate) has a negative impact on household consumption expenditure during both terms short run and long run. Therefore, it is expected that when the lending rate increases, household consumption expenditure also increases. According to the life-cycle hypothesis, when the interest rate increases household consumption decreases. The outcomes are also supported by Anthony *et al.* (2014). The ARDL (2, 0, 1, 0, 0,1) consumption model was the best model to be estimated as it passes all the diagnostic inspection.

6.7 CONCLUSION

Chapter 6 empirical evaluated the impact of government social spending on economic growth, income inequality and household consumption. The overall impact of government social spending (education, health and social protection) on economic growth has been assessed, using the statistical and econometric techniques portrayed in chapter five. All the empirical estimations have been conducted in EViews 10.

A preliminary assessment of the time series data employed, followed by unit root tests ADF and PP, were discussed. The Autoregressive Distributed Lag (ARDL) Models for Growth, Gini and Consumption functions were estimated, including the ARDL bound test, which deals with cointegration relationships. The results indicated the existence of a cointegrating relationship in all three models. The study has estimated the long run and short run dynamics for all growth, Gini and consumption models, followed by the diagnostic check-ups for all models.

CHAPTER SEVEN

CONCLUSION AND POLICY RECOMMENDATIONS

7.1 INTRODUCTION

This chapter presents a brief summary of the study and gives policy recommendations based on the empirical results. The summary of the study is presented in section 7.2. The summary of empirical results for growth, Gini and consumption models is presented in section 7.3. Section 7.4 concerns policy implication and recommendations. Finally, section 7.5 discusses limitations of the study and offers recommendation for further research.

7.2 THE SUMMARY OF THE STUDY

The main objective of the study was to investigate the nexus between government social spending and economic growth in South Africa from 1983 to 2016, through empirical examining the impact of government social spending on economic growth, income inequality and household consumption.

Chapter one outlined the background of the study, and defined the problem statement which was the motivation for the present study. Furthermore, the research objectives, and null hypotheses, which makes it possible to ascertain the empirical relationship between government social spending and economic wellbeing in South Africa, were given. Chapter two presented the theoretical and empirical literature applicable to the relationship between government social spending and economic growth. Chapter three reviewed the channels of government social spending which impact on economic growth, the income distribution channel and household consumption channel. Chapter four discuss government social spending in South Africa and the important transformation that occurred as results of democracy. Chapter five discussed methodology approaches adopted by the study, and the justification of the variables employed. The theoretical frameworks for ADF and PP units root tests, ARDL approach and the diagnostic tests were presented. Through this econometrics approach, the study was able to check the null hypotheses of the study. Null hypothesis 1 stated that government social spending does not have a significant impact on economic growth. Null hypothesis 2 stated that government social spending does not have a significant impact on income inequality. Null hypothesis 3 suggested that government social spending does not have a significant impact on household

consumption expenditure. Chapter six presented the results the estimated models and interpretations.

7.3 SUMMARY OF EMPIRICAL RESULTS

This section is divided into three sub-sections: the first part is concerned with the empirical results for the growth model; the second part presents the Gini model of empirical finding, and the third part discusses the empirical findings from the consumption model.

7.3.1 Growth Model

The study investigated the impact of government social spending on economic growth in South Africa, with time series data spanning from 1983 to 2016. The ARDL modelling approach was employed to empirical examine the relationship between government social spending (on education, health and social protection) real GDP per capita. This model also included money supply and the real effective exchange rate as control variables.

The ARDL bound test for growth model indicated the existence of a cointegration relationship between government social spending variables, control variables and real GDP per capita, therefore, permitting the evaluation of long run estimates and short run estimates. The results showed that education spending improves economic growth during the short run, but has an insignificant impact on economic growth in the long run. Health spending has a negative impact on economic growth during the short run, however, stimulates growth in the long run. Social protection spending boosts economic growth during both in the short run and the long run. The overall results revealed that the social spending variables have inelastic impact on economic growth. Despite having low elasticities government social spending on health appear to have relatively larger impact on economic growth followed by social protection expenditure in the long-run. However, during the short-run the larger variation in economic growth is caused by education, followed by health and social protection.

Concerning the control variables, the rise in money supply stimulates the South African economy in both short run and long run. The increase in the real effective exchange rate (appreciation of South African currency) causes economic growth to decline.

7.3.2 Gini Model

The study examined the effect of government social spending on income inequality in South Africa, from 1983 to 2015, again employing the ARDL methodology for econometric estimations. The study used the same government social spending variables used in the growth model (education, health and social protection) and the Gini coefficient as a proxy for income inequality. Disposable income per capita and real interest rate (lending rate) were used as control variables.

The ARDL bound test for the Gini model indicated the existence of a long run relationship between government social spending on education, health and social protection, control variables (disposable income per capita and real interest rate) and income inequality (Gini coefficient). Thus, the long run and short run analyses generated the following results.

The findings showed that education spending has an insignificant impact on income inequality during short run, but an equalizing effect on income distribution in the long run. Health spending promotes income inequality during the short run, but stimulates equality in income distribution in the long run. Social protection spending reduces income inequality during the short run but promotes inequality in the long run. The overall results indicate that the social spending variables have small impact on income inequality. Despite having low elasticities government social spending on health appear to have relatively larger impact on income inequality followed by social protection and education spending in the long-run. However, during the short-run the larger variation in inequality is caused by health, followed by social protection spending.

Examining the control variables, disposable income per capita has the highest equalizing effect on income distribution, during both short run and long run. The real interest rate (lending rate) does not cause any variation in income inequality during the short run, however, it promotes income inequality in the long run.

7.3.3 Consumption Model

The final empirical analyses investigated the impact of government social spending on household consumption expenditure from 1983 to 2016. The long run and short run dynamics have been captured through ARDL modelling. The regressors of the model were government social spending on education, health social protection, disposable

income per capita and real interest rate (lending rate). Thus, the ARDL bound test shows the existence of a cointegration relationship between government social spending variables, control variables and household consumption expenditure. The short run and long run results are as follows.

The results indicated that government social spending on education has an insignificant effect on household consumption during both the short run and long run. Therefore, the possible reasons for such results have presented in the discussion section of this model. Public health spending has an insignificant impact on household consumption spending during the short run, however, it reduces household consumption expenditure in the long run. Social protection spending also has an insignificant impact on household consumption expenditure in the short run but promotes household consumption expenditure during the long run.

The overall results indicate that the government social spending variables have inelastic impact on household consumption spending. Despite having low elasticities government social spending on health appear to have relatively larger impact on household consumption expenditure followed by social protection spending in the long-run. However, during the short-run all the social spending variables have insignificant impact on household consumption.

Concerning the control variables, disposable income per capita has an insignificant impact on household consumption spending during the short run but stimulates household consumption expenditure in the long run. Disposable income per capita has an elastic impact on household consumption expenditure, which is the greatest impact compared to other independent variables. The real interest rate (lending rate) has a negative impact on household consumption in both short run and long run. Therefore, a rise in the lending rate causes household consumption expenditure to reduce in South Africa.

7.4 POLICY IMPLICATION AND RECOMMENDATION

The most important finding of the study is that most of the government social spending variables have a significant impact on economic growth, income inequality and household consumption. However, the impact of social spending variables was inelastic in all three models. Therefore, the inelastic impact suggests that government social spending has a low impact on economic growth, income inequality and

household consumption. Thus, government may have some difficulties in achieve the 2030 goals proposed in the NDP policy, which is to have created 11 million jobs by 2030 and have reduced the unemployment rate to 6%, with an annual growth rate of 5.4%.

Because of the higher structural unemployment that exists in South Africa, government should consider whether the programmes it funds at tertiary institutions, promote the macroeconomic objectives of the nation. If the programmes correspond to the requirement of employers (labour market), thus reducing the structural unemployment rate. It a waste of resources if government funds education programmes or degrees for students that will not contribute to sustainable long run economic growth. The government should check the quality of the educational programmes it sponsors, because if the quality is poor then it may be expected to generate low returns to economic growth.

Also, the government may expand its investment in health care. It is important, that such expansion is met by quality services being provided at public health institutions. Thus, investment must be directed to programmes that promote healthy lifestyles, awareness, and prevention of disease, especially in rural areas.

The social protection programmes which only deal with social grants in South Africa must be transformed to include labour market intervention. This will assist in training unemployed people and create jobs, thus giving the unemployed an opportunity to be absorbed into the labour market. In this manner, social protection programmes will give poor people an opportunity to participate in economic activities.

With regards to control variables, disposable income per capita had an elastic effect on both Gini and consumption models. The positive variation caused by disposable income per capita was greater than the impact caused by government social spending. Disposable income per capita is essential in the South African economy, as it stimulates the equal distribution of income and household consumption expenditure. In conclusion the government cannot overall rely on government social spending to boost its economic perspective therefore, may need to focus on other economic fundamentals to raise economic wellbeing.

7.5 LIMITATION OF THE STUDY AND RECOMMENDATIONS FOR FURTHER RESEARCH

The study evaluated the impact of government social spending on economic growth, income distribution and household consumption in South Africa. The social spending data employed by the study was in aggregate measurement, this is because of the shortage of disaggregated data available for education, health and social protection spending. Therefore, the study could not determine the distinct impact that education spending at tertiary, secondary and primary have on economic growth, income inequality and household consumption spending. This may have even contributed to the social spending variables having unexpected impact on the dependent variables. Therefore, for further research, disaggregated social spending variable on education, health and social protection and should be used.

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APPENDICES

APPENDIX A

Table A1: ADF Unit Root Test Result

Variables	T-Statistics	Critical value	Lags	Restrictions	Conclusion
LGDPpc	-2.7554	-3.5578	1	Constant & Trend	Non-stationary Integrated of order 1
D(LGDPpc)	-3.7484**	-3.5578	0	Constant & Trend	
LEDUpc	-2.0819	-3.5529	0	Constant & Trend	Non-stationary Integrated of order 1
D(LEDUpc)	-5.6368**	-3.5578	0	Constant & Trend	
LHEApc	-1.5328	-3.5529	0	Constant & Trend	Non-stationary Integrated of Order 1
D(LHEApc)	-5.6147**	-3.5578	0	Constant & Trend	
LSOPpc	-0.7093	-2.9604	2	Constant	Non-stationary Integrated of order 1
D(LSOPpc)	-7.4182**	-2.9571	0	Constant	
LCONSpC	-2.8954	-3.2123	1	Constant & Trend	Non-stationary Integrated of order 1
D(LCONSpC)	-3.4692*	-3.2124	0	Constant & Trend	
LGINI	-0.4228	-2.6192	1	Constant	Non-stationary Integrated of order 1
D(LGINI)	-2.9391*	-2.6192	0	Constant	
LMS	-2.9356	-3.5578	1	Constant & Trend	Non-stationary Integrated of order 1
D(LMS)	-3.7467**	-3.5578	0	Constant & Trend	
LDIpc	-2.7217	-3.5578	1	Constant & Trend	Non- stationary Integrated of order 1.
D(LDIpc)	-4.3505	-3.5578	0	Constant & Trend	
RIR	-2.8937	-3.5529	0	Constant & Trend	Non-Stationary Integrated of order 1
D(RIR)	-7.7400**	-3.5577		Constant & Trend	
LREER	-3.4212*	-3.2096	0	Constant & Trend	Stationary integrated of order 0

Notes Asterisks * and ** denotes statistically significant at 10% and 5% respectively. While the lag length for ADF tests are automatically chosen by the Schwarz Information Criterion (SIC).

Table A2: Phillips – Perron Unit Root Test Results

Variables	T-Statistics	Critical values	N.W.B	Restrictions	Conclusion
LGDPpc	-1.6186	-3.5529	2	Constant & Trend	Non-stationary Integrated of order 1
D(LGDPpc)	-3.7269**	-3.5577	4	Constant & Trend	
LEDUpc	-2.1227	-3.5529	1	Constant & Trend	Non-stationary Integrated of order 1
D(LEDUpc)	-5.6374**	-3.5578	2	Constant & Trend	
LHEApc	-1.4824	-3.5529	2	Constant & Trend	Non-stationary Integrated of order 1
D(LHEApc)	-5.6291**	-3.5578	2	Constant & Trend	
LSOPpc	-0.5958	-2.9540	4	Constant	Non-stationary Integrated of order 1
D(LSOPpc)	-8.3273**	-2.9571	5	Constant	
LCONSpC	-2.1991	-3.2096	2	Constant & Trend	Non-stationary Integrated of order 1
D(LCONSpC)	-3.3058*	-3.2124	8	Constant & Trend	
LGINI	-0.2117	-2.6174	3	Constant	Non-stationary Integrated of order 1
D(LGINI)	-2.9698*	-2.6192	2	Constant	
LMS	-1.8889	-3.5529	1	Constant & Trend	Non-stationary Integrated of order 1
D(LMS)	-3.5957**	-3.5578	5	Constant & Trend	
LDIpc	-1.6356	-3.5529	5	Constant & Trend	Non-stationary Integrated of order 1.
D(LDIpc)	-4.2563**	-3.5578	11	Constant & Trend	
RIR	-3.0129	-3.5529	2	Constant & Trend	Non-Stationary Integrated of order 1
D(RIR)	-7.3537**	-3.5578	4	Constant & Trend	
LREER	-3.4211*	-3.2096	0	Constant & Trend	Stationary integrated of order 0.

Notes Asterisks * and ** denotes statistically significant at 10% and 5% respectively. While the bandwidths for PP tests are automatically chosen by the Newey West Bartlett Kernel Selection.

APPENDIX B

Table B1: ARDL Estimates Results for Growth Model

Dependent Variable: LGDPPC
 Method: ARDL
 Date: 01/22/19 Time: 14:59
 Sample (adjusted): 1985 2016
 Included observations: 32 after adjustments
 Maximum dependent lags: 2 (Automatic selection)
 Model selection method: Akaike info criterion (AIC)
 Dynamic regressors (2 lags, automatic): LEDUPC LHEAPC LSOPPC LMS
 LREER
 Fixed regressors: C @TREND
 Number of models evaluated: 486
 Selected Model: ARDL(1, 2, 2, 1, 1, 2)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LGDPPC(-1)	0.439444	0.149934	2.930914	0.0098
LEDUPC	0.387632	0.126470	3.065016	0.0074
LEDUPC(-1)	-0.039511	0.109784	-0.359895	0.7236
LEDUPC(-2)	-0.214404	0.086354	-2.482856	0.0245
LHEAPC	-0.208681	0.089277	-2.337469	0.0327
LHEAPC(-1)	0.037295	0.087863	0.424472	0.6769
LHEAPC(-2)	0.366541	0.091800	3.992834	0.0010
LSOPPC	0.043574	0.027194	1.602347	0.1286
LSOPPC(-1)	0.045499	0.023099	1.969713	0.0664
LMS	0.367219	0.050023	7.340962	0.0000
LMS(-1)	-0.140957	0.054210	-2.600190	0.0193
LREER	-0.113728	0.049783	-2.284445	0.0363
LREER(-1)	0.044537	0.045593	0.976844	0.3432
LREER(-2)	-0.071103	0.043182	-1.646588	0.1191
C	4.190921	1.066062	3.931217	0.0012
@TREND	-0.009821	0.003058	-3.211171	0.0054
R-squared	0.994465	Mean dependent var	4.683633	
Adjusted R-squared	0.989276	S.D. dependent var	0.042847	
S.E. of regression	0.004437	Akaike info criterion	-7.690780	
Sum squared resid	0.000315	Schwarz criterion	-6.957913	
Log likelihood	139.0525	Hannan-Quinn criter.	-7.447855	
F-statistic	191.6494	Durbin-Watson stat	2.292079	
Prob(F-statistic)	0.000000			

*Note: p-values and any subsequent tests do not account for model

selection.

Table B2: ARDL Long-Run Form and Bound Test for Growth Model

ARDL Long Run Form and Bounds Test

Dependent Variable: D(LGDPPC)

Selected Model: ARDL(1, 2, 2, 1, 1, 2)

Case 5: Unrestricted Constant and Unrestricted Trend

Date: 01/22/19 Time: 15:00

Sample: 1983 2016

Included observations: 32

Conditional Error Correction Regression				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.190921	1.066062	3.931217	0.0012
@TREND	-0.009821	0.003058	-3.211171	0.0054
LGDPPC(-1)*	-0.560556	0.149934	-3.738675	0.0018
LEDUPC(-1)	0.133718	0.162590	0.822420	0.4229
LHEAPC(-1)	0.195155	0.095339	2.046970	0.0575
LSOPPC(-1)	0.089073	0.034131	2.609764	0.0190
LMS(-1)	0.226261	0.060652	3.730457	0.0018
LREER(-1)	-0.140294	0.065732	-2.134326	0.0486
D(LEDUPC)	0.387632	0.126470	3.065016	0.0074
D(LEDUPC(-1))	0.214404	0.086354	2.482856	0.0245
D(LHEAPC)	-0.208681	0.089277	-2.337469	0.0327
D(LHEAPC(-1))	-0.366541	0.091800	-3.992834	0.0010
D(LSOPPC)	0.043574	0.027194	1.602347	0.1286
D(LMS)	0.367219	0.050023	7.340962	0.0000
D(LREER)	-0.113728	0.049783	-2.284445	0.0363
D(LREER(-1))	0.071103	0.043182	1.646588	0.1191

* p-value incompatible with t-Bounds distribution.

Levels Equation				
Case 5: Unrestricted Constant and Unrestricted Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LEDUPC	0.238545	0.299682	0.795994	0.4377
LHEAPC	0.348146	0.119563	2.911830	0.0102
LSOPPC	0.158901	0.078555	2.022812	0.0601
LMS	0.403638	0.086891	4.645314	0.0003

LREER	-0.250276	0.122839	-2.037425	0.0585
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$$EC = LGDPPC - (0.2385 * LEDUPC + 0.3481 * LHEAPC + 0.1589 * LSOPPC + 0.4036 * LMS - 0.2503 * LREER)$$

F-Bounds Test Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	4.903211	10%	2.75	3.79
K	5	5%	3.12	4.25
		2.5%	3.49	4.67
		1%	3.93	5.23
Actual Sample Size	32		Finite Sample: n=35	
		10%	3.087	4.277
		5%	3.673	5.002
		1%	5.095	6.77
			Finite Sample: n=30	
		10%	3.157	4.412
		5%	3.818	5.253
		1%	5.347	7.242

t-Bounds Test Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
t-statistic	-3.738675	10%	-3.13	-4.21
		5%	-3.41	-4.52
		2.5%	-3.65	-4.79
		1%	-3.96	-5.13

Table B3: Short -Run Error Correction Regression for Growth Model

ECM Regression				
Case 5: Unrestricted Constant and Unrestricted Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.190921	0.676407	6.195858	0.0000
@TREND	-0.009821	0.001656	-5.931112	0.0000
D(LEDUPC)	0.387632	0.085298	4.544429	0.0003
D(LEDUPC(-1))	0.214404	0.068592	3.125777	0.0065
D(LHEAPC)	-0.208681	0.060423	-3.453673	0.0033
D(LHEAPC(-1))	-0.366541	0.077011	-4.759568	0.0002
D(LSOPPC)	0.043574	0.017548	2.483212	0.0245
D(LMS)	0.367219	0.037444	9.807075	0.0000
D(LREER)	-0.113728	0.031372	-3.625088	0.0023
D(LREER(-1))	0.071103	0.028346	2.508412	0.0233
CointEq(-1)*	-0.560556	0.090210	-6.213919	0.0000
R-squared	0.880917	Mean dependent var		0.001890
Adjusted R-squared	0.824211	S.D. dependent var		0.009237
S.E. of regression	0.003873	Akaike info criterion		-8.003280
Sum squared resid	0.000315	Schwarz criterion		-7.499434
Log likelihood	139.0525	Hannan-Quinn criter.		-7.836270
F-statistic	15.53476	Durbin-Watson stat		2.292079
Prob(F-statistic)	0.000000			

Figure B1: Normality Test Results for Growth model

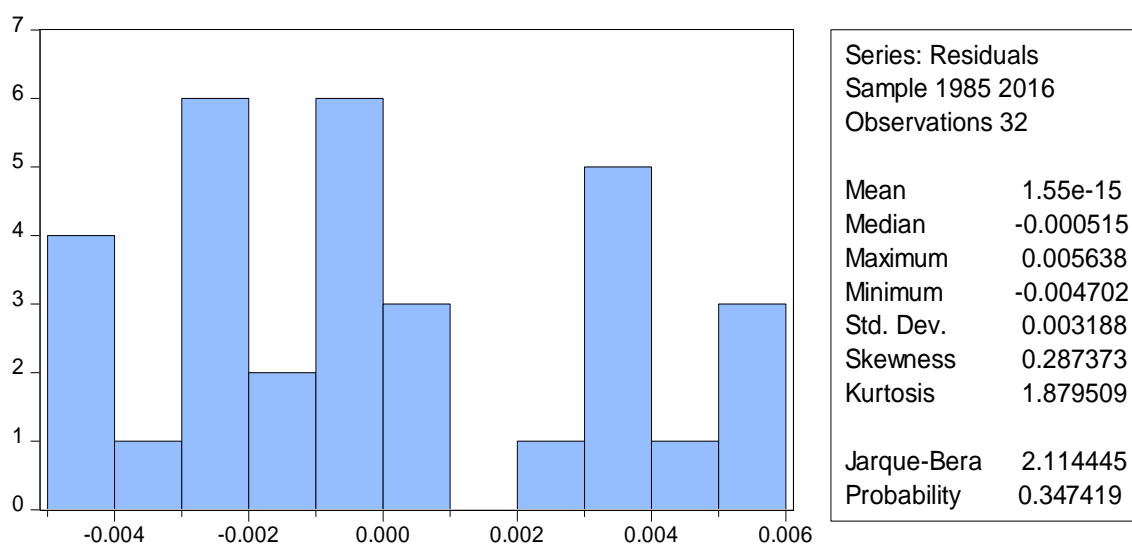


Table B4: Serial Correlation Test Results for Growth Model

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.148568	Prob. F(2,14)	0.3452
Obs*R-squared	4.510507	Prob. Chi-Square(2)	0.1048

Table B5: Heteroskedasticity Test Results for Growth Model

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.900317	Prob. F(15,16)	0.5783
Obs*R-squared	14.64686	Prob. Chi-Square(15)	0.4771
Scaled explained SS	1.610256	Prob. Chi-Square(15)	1.0000

Table B6: Ramsey RESET Test Results for Growth Model

Ramsey RESET Test

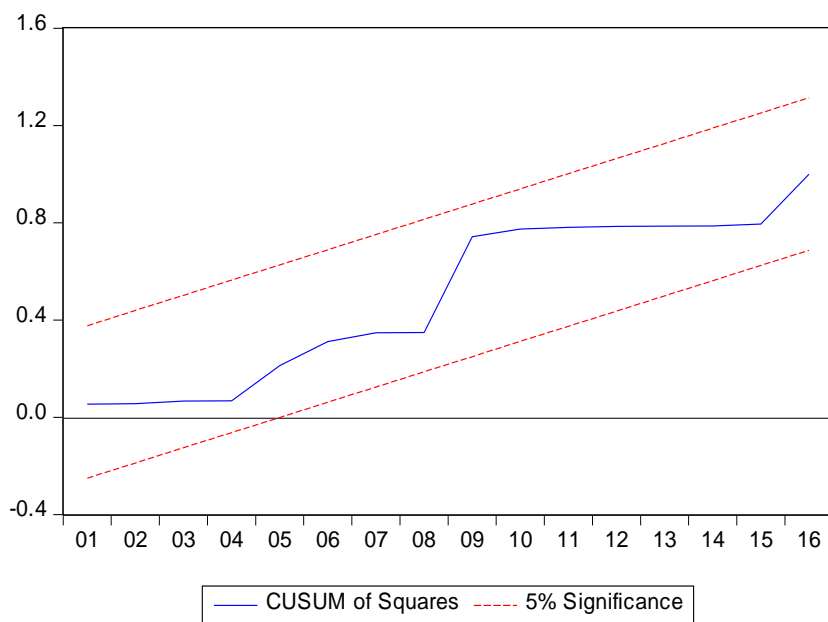
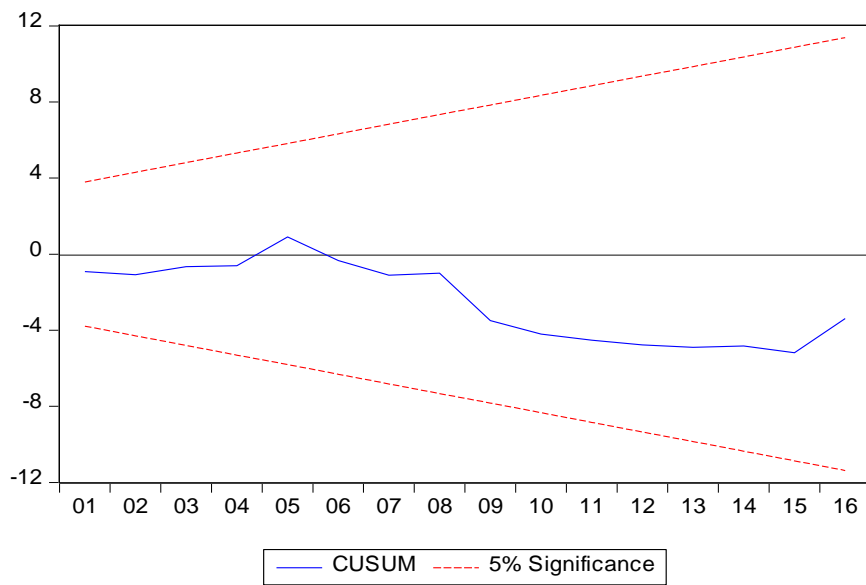
Equation: UNTITLED

Specification: LGDPPC LGDPPC(-1) LEDUPC LEDUPC(-1) LEDUPC(-2)
 LHEAPC LHEAPC(-1) LHEAPC(-2) LSOPPC LSOPPC(-1) LMS LMS(-1)
 LREER LREER(-1) LREER(-2) C @TREND

Omitted Variables: Squares of fitted values

	Value	df	Probability
t-statistic	0.098124	15	0.9231
F-statistic	0.009628	(1, 15)	0.9231
Likelihood ratio	0.020534	1	0.8861

Figure B2: Stability Test Results for Growth Model



APPENDIX C

Table C1: ARDL Estimates Results for Gini Model

Dependent Variable: LGINI
 Method: ARDL
 Date: 12/12/18 Time: 23:53
 Sample (adjusted): 1986 2015
 Included observations: 30 after adjustments
 Maximum dependent lags: 1 (Automatic selection)
 Model selection method: Akaike info criterion (AIC)

Dynamic regressors (3 lags, automatic): LEDUPC LHEAPC LSOPPC

LDIPC RIR

Fixed regressors: DUMMY C @TREND

Number of models evaluated: 1024

Selected Model: ARDL(1, 0, 2, 3, 2, 0)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LGINI(-1)	-0.017171	0.127890	-0.134265	0.8951
LEDUPC	-0.050576	0.012354	-4.093851	0.0011
LHEAPC	-0.014362	0.010624	-1.351818	0.1979
LHEAPC(-1)	-0.003403	0.006872	-0.495164	0.6282
LHEAPC(-2)	-0.038325	0.007451	-5.143279	0.0001
LSOPPC	0.017740	0.003776	4.697865	0.0003
LSOPPC(-1)	0.016378	0.003520	4.652747	0.0004
LSOPPC(-2)	0.011176	0.002595	4.305968	0.0007
LSOPPC(-3)	0.014979	0.003328	4.501033	0.0005
LDIPC	-32.13441	6.812623	-4.716893	0.0003
LDIPC(-1)	37.57903	10.50767	3.576344	0.0030
LDIPC(-2)	-14.05255	4.711751	-2.982448	0.0099
RIR	0.000383	7.07E-05	5.423310	0.0001
DUMMY	-0.005550	0.001313	-4.226488	0.0008
C	8.960022	0.978273	9.159024	0.0000
@TREND	0.006207	0.000678	9.149907	0.0000
R-squared	0.998293	Mean dependent var		1.757149
Adjusted R-squared	0.996463	S.D. dependent var		0.007928
S.E. of regression	0.000472	Akaike info criterion		-12.17675
Sum squared resid	3.11E-06	Schwarz criterion		-11.42945
Log likelihood	198.6513	Hannan-Quinn criter.		-11.93768
F-statistic	545.6763	Durbin-Watson stat		2.513230
Prob(F-statistic)	0.000000			

*Note: p-values and any subsequent tests do not account for model

Table C2: ARDL Long Run Form and Bound Test for Gini Model

ARDL Long Run Form and Bounds Test

Dependent Variable: D(LGINI)

Selected Model: ARDL(1, 0, 2, 3, 2, 0)

Case 5: Unrestricted Constant and Unrestricted Trend

Date: 12/12/18 Time: 23:55

Sample: 1983 2015

Included observations: 30

Conditional Error Correction Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	8.960021	0.978273	9.159022	0.0000
@TREND	0.006207	0.000678	9.149906	0.0000
LGINI(-1)*	-1.017171	0.127890	-7.953497	0.0000
LEDUPC**	-0.050576	0.012354	-4.093856	0.0011
LHEAPC(-1)	-0.056090	0.008974	-6.250113	0.0000
LSOPPC(-1)	0.060272	0.009633	6.257125	0.0000
LDIPC(-1)	-8.607932	0.956722	-8.997321	0.0000
RIR**	0.000383	7.07E-05	5.423310	0.0001
D(LHEAPC)	-0.014362	0.010624	-1.351811	0.1979
D(LHEAPC(-1))	0.038325	0.007451	5.143280	0.0001
D(LSOPPC)	0.017740	0.003776	4.697860	0.0003
D(LSOPPC(-1))	-0.026155	0.004737	-5.521197	0.0001
D(LSOPPC(-2))	-0.014979	0.003328	-4.501031	0.0005
D(LDIPC)	-32.13430	6.812611	-4.716885	0.0003
D(LDIPC(-1))	14.05247	4.711742	2.982436	0.0099
DUMMY	-0.005550	0.001313	-4.226484	0.0008

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	17.29873	10%	2.75	3.79
K	5	5%	3.12	4.25
		2.5%	3.49	4.67
		1%	3.93	5.23
			Finite Sample: n=30	
Actual Sample Size	30			
		10%	3.157	4.412
		5%	3.818	5.253
		1%	5.347	7.242

Table C7: Short -Run Error Correction Regression for Gini Model

ARDL Error Correction Regression

Dependent Variable: D(LGINI)

Selected Model: ARDL(1, 0, 2, 3, 2, 0)

Case 5: Unrestricted Constant and Unrestricted Trend

Date: 01/06/19 Time: 16:49

Sample: 1983 2015

Included observations: 30

ECM Regression				
Case 5: Unrestricted Constant and Unrestricted Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	8.960022	0.754321	11.87827	0.0000
@TREND	0.006207	0.000529	11.73042	0.0000
D(LHEAPC)	-0.014362	0.004301	-3.338945	0.0049
D(LHEAPC(-1))	0.038325	0.005976	6.413248	0.0000
D(LSOPPC)	0.017740	0.001843	9.625769	0.0000
D(LSOPPC(-1))	-0.026155	0.002961	-8.833125	0.0000
D(LSOPPC(-2))	-0.014979	0.002021	-7.412297	0.0000
D(LDIPC)	-32.13434	4.208151	-7.636214	0.0000
D(LDIPC(-1))	14.05249	3.593763	3.910244	0.0016
DUMMY	-0.005550	0.000609	-9.116264	0.0000
CointEq(-1)*	-1.017171	0.085704	-11.86849	0.0000

R-squared	0.932390	Mean dependent var	0.000657
Adjusted R-squared	0.896806	S.D. dependent var	0.001260
S.E. of regression	0.000405	Akaike info criterion	-12.51008
Sum squared resid	3.11E-06	Schwarz criterion	-11.99631
Log likelihood	198.6513	Hannan-Quinn criter.	-12.34572
F-statistic	26.20245	Durbin-Watson stat	2.513230
Prob(F-statistic)	0.000000		

Figure C1: Normality Test for Gini Model

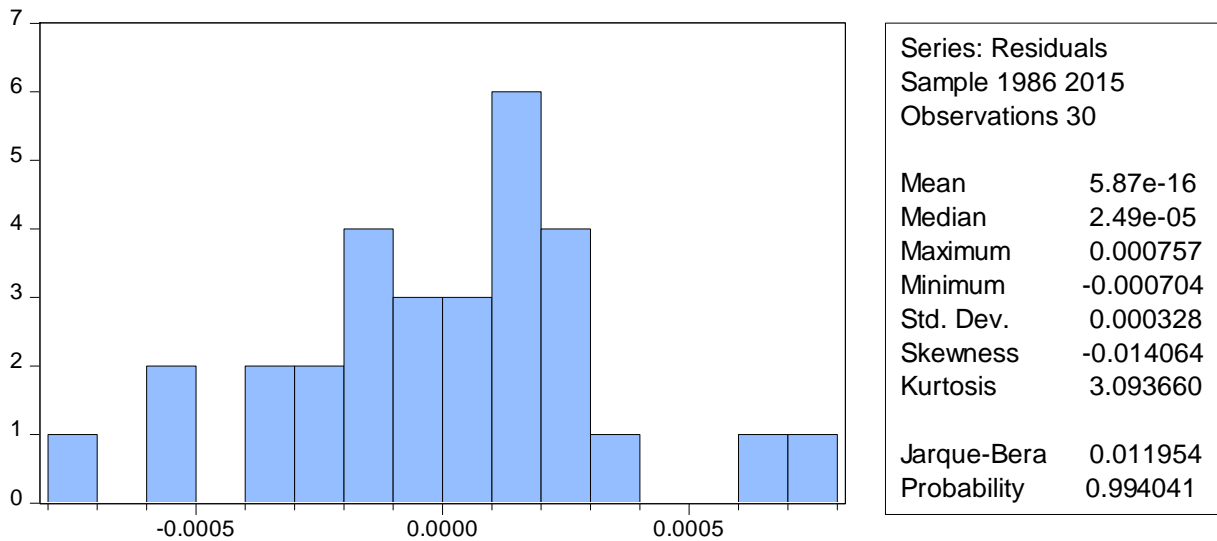


Table C3: Serial Correlation Test Results for Gini Model

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.191574	Prob. F(1,13)	0.2948
Obs*R-squared	2.518905	Prob. Chi-Square(1)	0.1125

Table C4: Heteroskedasticity Test Results for Gini Model

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.294084	Prob. F(14,15)	0.9862
Obs*R-squared	6.460967	Prob. Chi-Square(14)	0.9535
Scaled explained SS	1.472948	Prob. Chi-Square(14)	1.0000

Table C5: Ramsey RESET Test Results for Gini Model

Ramsey RESET Test

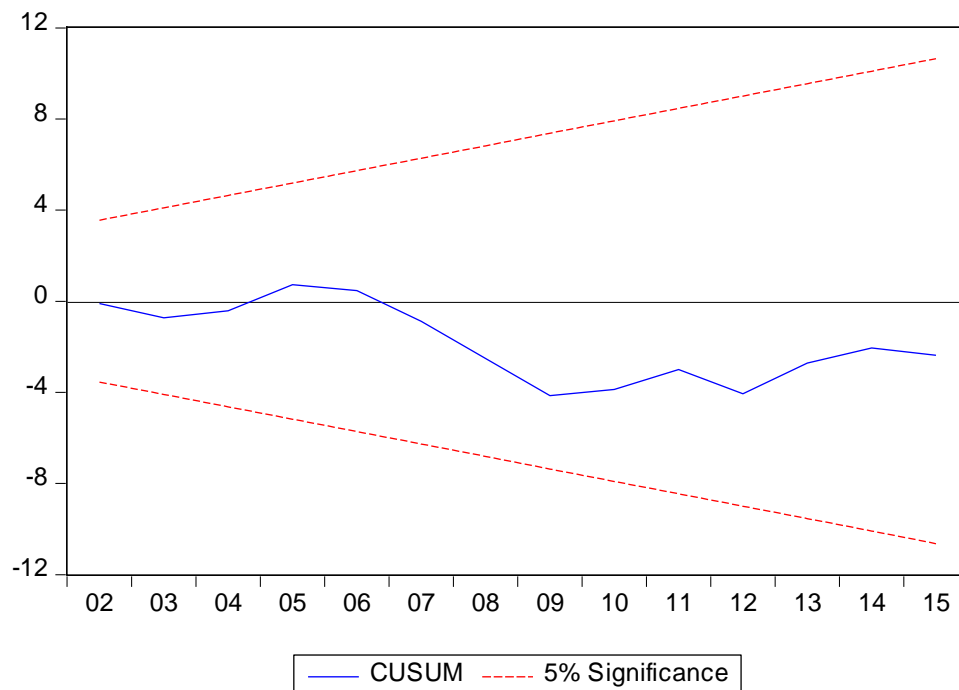
Equation: UNTITLED

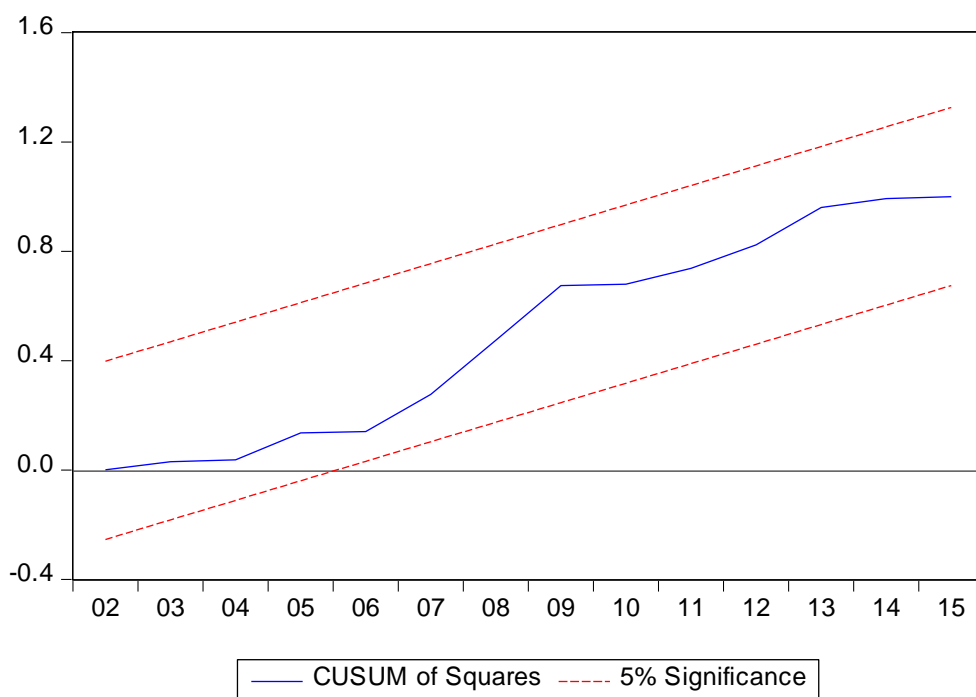
Specification: LGINI LGINI(-1) LEDUPC LHEAPC LHEAPC(-1) LHEAPC(-2) LSOPPC LSOPPC(-1) LSOPPC(-2) LSOPPC(-3) LDIPC LDIPC(-1) LDIPC(-2) RIR DUMMY C @TREND

Omitted Variables: Squares of fitted values

	Value	df	Probability
t-statistic	1.184285	13	0.2575
F-statistic	1.402531	(1, 13)	0.2575
Likelihood ratio	3.073637	1	0.0796

Figure C2: Stability Test Results for Gini Model





APPENDIX D

Table D1: ARDL Estimates Results for Consumption Model

Dependent Variable: LCONSPC

Method: ARDL

Date: 01/06/19 Time: 21:06

Sample (adjusted): 1985 2016

Included observations: 32 after adjustments

Maximum dependent lags: 2 (Automatic selection)

Model selection method: Akaike info criterion (AIC)

Dynamic regressors (2 lags, automatic): LEDUPC LHEAPC LSOPPC

LDIPC RIR

Fixed regressors: C @TREND

Number of models evaluated: 486

Selected Model: ARDL(2, 0, 1, 0, 0, 1)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LCONSPC(-1)	0.720063	0.186738	3.856011	0.0009
LCONSPC(-2)	-0.468089	0.143079	-3.271551	0.0036
LEDUPC	0.058666	0.121182	0.484117	0.6333
LHEAPC	-0.040715	0.127476	-0.319391	0.7526
LHEAPC(-1)	-0.207045	0.081031	-2.555148	0.0184
LSOPPC	0.077706	0.034026	2.283711	0.0329
LDIPC	0.869485	0.223998	3.881666	0.0009
RIR	-0.003041	0.000804	-3.783301	0.0011
RIR(-1)	0.001393	0.000660	2.109931	0.0470

C	-7.172016	1.607517	-4.461550	0.0002
@TREND	0.003489	0.001437	2.428667	0.0242
R-squared	0.995060	Mean dependent var		-3.598145
Adjusted R-squared	0.992707	S.D. dependent var		0.095841
S.E. of regression	0.008185	Akaike info criterion		-6.506823
Sum squared resid	0.001407	Schwarz criterion		-6.002977
Log likelihood	115.1092	Hannan-Quinn criter.		-6.339812
F-statistic	422.9747	Durbin-Watson stat		2.006731
Prob(F-statistic)	0.000000			

*Note: p-values and any subsequent tests do not account for model

Table D2: ARDL Long-Run Form and Bound Test for Consumption Model

ARDL Long Run Form and Bounds Test

Dependent Variable: D(LCONSPC)

Selected Model: ARDL(2, 0, 1, 0, 0, 1)

Case 5: Unrestricted Constant and Unrestricted Trend

Date: 01/06/19 Time: 21:07

Sample: 1983 2016

Included observations: 32

Conditional Error Correction Regression				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-7.172016	1.607517	-4.461550	0.0002
@TREND	0.003489	0.001437	2.428667	0.0242
LCONSPC(-1)*	-0.748026	0.131046	-5.708109	0.0000
LEDUPC**	0.058666	0.121182	0.484117	0.6333
LHEAPC(-1)	-0.247760	0.102293	-2.422053	0.0246
LSOPPC**	0.077706	0.034026	2.283711	0.0329
LDIPC**	0.869485	0.223998	3.881666	0.0009
RIR(-1)	-0.001648	0.000646	-2.553039	0.0185
D(LCONSPC(-1))	0.468089	0.143079	3.271551	0.0036
D(LHEAPC)	-0.040715	0.127476	-0.319391	0.7526
D(RIR)	-0.003041	0.000804	-3.783301	0.0011

* p-value incompatible with t-Bounds distribution.

** Variable interpreted as $Z = Z(-1) + D(Z)$.

Levels Equation

Case 5: Unrestricted Constant and Unrestricted Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LEDUPC	0.078428	0.166679	0.470536	0.6428
LHEAPC	-0.331218	0.148812	-2.225752	0.0371
LSOPPC	0.103881	0.045181	2.299246	0.0319
LDIPC	1.162373	0.218597	5.317434	0.0000
RIR	-0.002204	0.000972	-2.267377	0.0340

$$EC = LCONSPC - (0.0784*LEDUPC - 0.3312*LHEAPC + 0.1039*LSOPPC + 1.1624*LDIPC - 0.0022*RIR)$$

F-Bounds Test Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
Asymptotic: n=1000				
F-statistic	8.929989	10%	2.75	3.79
k	5	5%	3.12	4.25
		2.5%	3.49	4.67
		1%	3.93	5.23
Finite Sample: n=35				
Actual Sample Size	32	10%	3.087	4.277
		5%	3.673	5.002
		1%	5.095	6.77
Finite Sample: n=30				
		10%	3.157	4.412
		5%	3.818	5.253
		1%	5.347	7.242

t-Bounds Test Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
t-statistic	-5.708109	10%	-3.13	-4.21
		5%	-3.41	-4.52
		2.5%	-3.65	-4.79
		1%	-3.96	-5.13

Table D3: Short-Run Error Correction Regression for Consumption Model

ARDL Error Correction Regression
 Dependent Variable: D(LCONSPC)
 Selected Model: ARDL (2, 0, 1, 0, 0, 1)
 Case 5: Unrestricted Constant and Unrestricted Trend
 Date: 01/06/19 Time: 21:07
 Sample: 1983 2016
 Included observations: 32

ECM Regression				
Case 5: Unrestricted Constant and Unrestricted Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-7.172016	0.880855	-8.142110	0.0000
@TREND	0.003489	0.000455	7.666707	0.0000
D(LCONSPC(-1))	0.468089	0.098799	4.737776	0.0001
D(LHEAPC)	-0.040715	0.066230	-0.614749	0.5453
D(RIR)	-0.003041	0.000619	-4.912928	0.0001
CointEq(-1)*	-0.748026	0.091841	-8.144757	0.0000
R-squared	0.775034	Mean dependent var		0.006874
Adjusted R-squared	0.731772	S.D. dependent var		0.014203
S.E. of regression	0.007356	Akaike info criterion		-6.819323
Sum squared resid	0.001407	Schwarz criterion		-6.544498
Log likelihood	115.1092	Hannan-Quinn criter.		-6.728226
F-statistic	17.91462	Durbin-Watson stat		2.006731
Prob(F-statistic)	0.000000			

Figure D1: Normality Tests Result for Consumption Model

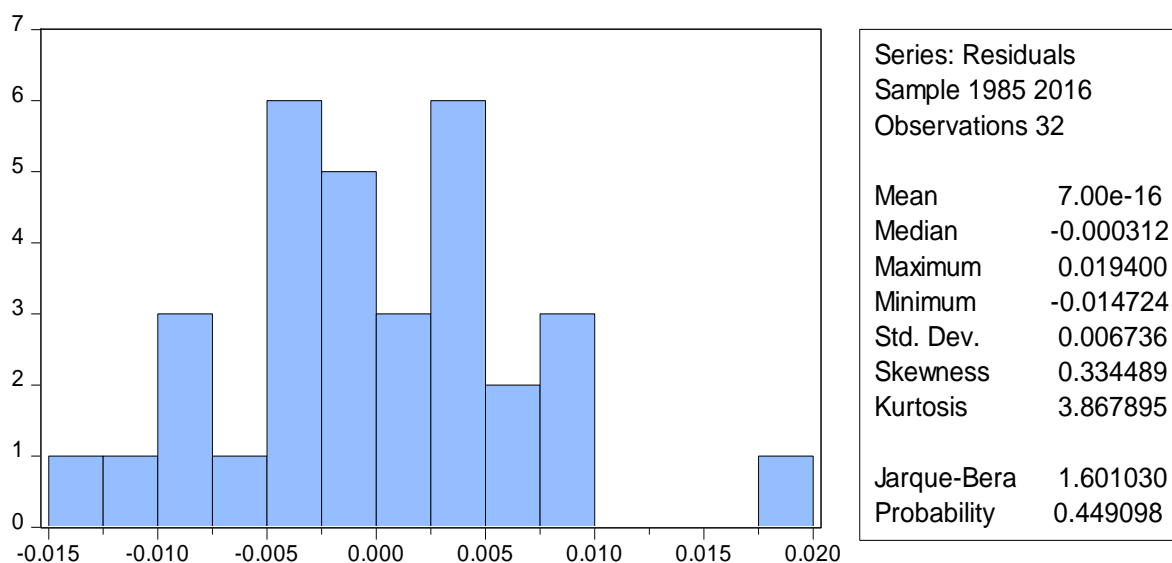


Table D 4: Serial Correlation Test Results for Consumption Model

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.198749	Prob. F(2,19)	0.8214
Obs*R-squared	0.655750	Prob. Chi-Square(2)	0.7205

Table D5: Heteroskedasticity Test Results for Consumption Model

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.527104	Prob. F(10,21)	0.8519
Obs*R-squared	6.420505	Prob. Chi-Square(10)	0.7788
Scaled explained SS	3.964981	Prob. Chi-Square(10)	0.9489

Table D6: Ramsey RESET Test Results for Consumption Model

Ramsey RESET Test

Equation: UNTITLED

Specification: LCONSPC LCONSPC(-1) LCONSPC(-2) LEDUPC

LHEAPC LHEAPC(-1) LSOPPC LDIPC RIR RIR(-1) C @TREND

Omitted Variables: Squares of fitted values

	Value	Df	Probability
t-statistic	1.201357	20	0.2436
F-statistic	1.443258	(1, 20)	0.2436
Likelihood ratio	2.229696	1	0.1354

Figure D2: Stability Tests Result for Consumption Model

